

# The United States MAGAZINE

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SOMEBODY perpetrates the following which should be "posted in a conspicuous place" where users of steam power may see it:

Patch her up, the dear old boiler,  
She has boiled of years a score;  
'Twould be cruel now to leave her—  
Where she ought to be—on shore  
At the junk shop.

Patch her up, the cracks are sizzling'  
In Providence we put our trust;  
Flags are waving, music playing,  
Surely she will never bust.  
Bang! Whang! Pop!

Well! Really that's the fust  
Time she ever bust!

## Looking for a Situation in Gunnison, Col.

Somewhere between Leadville and Gunnison City wanders a Detroiter who is penniless, ragged, hungry and discouraged. Four weeks ago he met a Michigan man out there and sent his love to all inquiring friends at home, and also explained why he was in that hard-up condition. He was too honest and particular for that country. He reached Gunnison City without a dollar in his pocket, but with lots of ambition in his soul, and soon met a man, who explained:

"I can give you the softest kind of a snap at \$4 a day. I want you to run one of my faro tables."

"But I don't know the game."

"You don't say, stranger? You must have had a queer bringing up. Out here and don't know faro! Pass on—no time to bother with you!"

The second man applied to for a situation squinted his eyes and took a long look at the Detroiter and quietly asked:

"Whar' from?"

"Detroit."

"No use—that's too far East. My pard run off with the company's funds last night and I kalkerlated on payin' somebody about \$100 to overtake him and bring me back his skalp. You'd look sweet takin' his trail, you would! You'd better inquire on the next corner."

The next was the site of a saloon about to be opened. The proprietor was a six-footer with a revolver on each hip, and in response to the inquiry he said:

"I s'pose you know how to pour whisky and weigh dust?"

"Yes."

"Suppose that one of the tough ones comes in after his nip and refuses to hand over."

"I'll call the police."

"Police be hanged! Every man's his own policeman out here. You must open on him with a shooter and keep pulling the trigger until he falls! The sit's open at \$3 a day and found."

"I—I guess I won't take it."

"Then git! No place for milksops around here. Might a knowned you hadn't any nerve by lookin' at ye!"

The Detroiter made one more effort. This time it was a man who explained:

"Glad to see you; set down a bit. Ye see, there's bad blood between me and a feller called Sandy Tom. We've agreed to drop each other on sight, and we mean business. I want to get the bulge on him, and bein' you're a stranger you can help me. Put this derringer in your pocket and go and shoot Sandy Tom, and I've got \$200 for ye!"

"Why, that would be murder!"

"What of it? Do you expect to hang out around here over a day without doin' any shootin'? Where was ye raised?"

"In Detroit."

"Git! You haven't any spinal column. You'd better run home to your ma, you had. Out ye go—so long!"

A GOOD GRINDSTONE.—The American Builder thus sums up the qualities of a good grindstone: It should be strong, simple and clean; the trough expanded to catch as much as possible of the drip water and grit; a movable shield, securely hinged, to keep the water

from splashing, and yet permit the stone to be used from either side; rests provided, upon which to rest tools and the rod for truing the stone, these rods being arranged to move toward the centre as the stone wears smaller. The bearings should be generous in size, proper provisions being made for oiling without washing the grit into the bearings with the oil, and the ends of the bearings being protected by some device which effectually prevents the entrance of the grit. The stone should be secured to the shaft by nuts and washers fixed so they cannot turn with the nuts as they are screwed up or unscrewed. In hanging the stone, great care should be taken to hang it true sidewise, not only for convenience in using, but because a stone that is not true sidewise can never be kept true edgewise.

## Things Worth Knowing.

TO KEEP LAMP CHIMNEYS FROM CRACKING.—The following recipe for keeping lamp chimneys from cracking is taken from the *Diamond*, a Leipzig journal devoted to the glass interest: Place your tumblers, chimneys or vessels, which you desire to keep from cracking, in a pot filled with cold water, add a little cooking salt, allow the mixture to boil well over a fire, and then cool slowly. Glass treated in this way is said not to crack even if exposed to very sudden changes of temperature. Chimneys are said to become very durable by this process, which may also be extended to crockery, stoneware, porcelain, etc. The process is simply one of annealing, and the slower the process, especially the cooling portion of it, the more effective will be the work.

BORAX TO PREVENT MILDEW.—We understand that experiments lately made by Whewell, of Blackburn, on the employment of borax for preventing mildew in cotton goods, show that it cannot be employed with flour paste, as it turns the paste yellow. It can be used with advantage with farina, as it does not color the paste, and also increases its tenacity. A six per cent solution can be employed, which, at the present price of borax, namely £65 per ton, is equal to about £4 per ton.—Textile Manufacturer.

TO MAKE CORKS AIR-TIGHT AND WATER-TIGHT.—A German chemical journal commends the use of paraffine as the best method of making porous corks gas and water tight. Allow the corks to remain for about five minutes beneath the surface of the melted paraffine in a suitable vessel, the corks being held down by a perforated lid, wire screen or similar device. Corks thus prepared can be easily cut and bored, have a perfectly smooth exterior, may be introduced and removed from the neck of a flask with ease, and make an absolutely perfect seal.

SOLID MUCILAGE.—Mucilage in a convenient solid form, and which will readily dissolve in water, for fastening paper prints, etc., may be made as follows: Boil one pound of the best white glue, and strain very clear; boil, also, four ounces of isinglass, and mix the two together; place them in a water bath—a glue pot will do—with one-half pound of white sugar, and evaporate until the liquid is quite thick, when it is to be poured into moulds, dried, and cut into pieces of convenient size.

PAINT FOR BASEMENT WALLS.—A dry coating for basement walls may be made as follows: Take 60 pounds of pitch, 30 pounds of resin, 6 pounds of English red and 12 pounds of brick-dust. Boil these ingredients, mix them and stir thoroughly, then add about one-fourth the volume of oil of turpentine, or enough to make it flow easily, so that a thin coating may be laid on with a whitewash or paint brush. Walls thus coated are proof against dampness.

HOW TO TEMPER CHISELS.—In hardening and tempering a cold chisel, care should be

taken to have a gradual shading of temper. If there is a distinct boundary line of temper color between the hard cutting edge and softer shank portion, it will be very apt to break at or near that line. The cutting edge portion of the chisel should be supported by a backing of steel gradually diminishing in hardness; and so with all metal cutting tools that are subjected to heavy strain. Not every workman becomes uniformly successful in this direction, for, in addition to dexterity, it requires a nice perception of degree of heat and of color in order to obtain the best result.

INDELIBLE INDIA INK.—Draughtsmen are aware of the fact that lines drawn on paper with good India ink which has been well prepared cannot be washed out by mere sponging or washing with a brush. Now, it is proposed to take advantage of the fact that glue or gelatine, when mixed with bichromate of potassa, and exposed to the light, becomes insoluble, and thus renders India ink, which always contains a little gelatine, indelible. Reisenbichler, the discoverer, calls this kind of ink "Haritzisch," or hard India ink. It is made by adding to the common article, when making, about one per cent, in a very fine powder, of bichromate of potash. This must be mixed with the ink in a dry state; otherwise, it is said, the ink could not be ground up easily in water. Those who cannot provide themselves with ink prepared as above in the cake, can use a dilute solution of bichromate of potash in rubbing up the ink; it answers the same purpose, though the ink should be used thick, so that the yellow salt will not spread.

## Results of the Turbine Tests.

*Holyoke Herald*: The Water Power Company have just published results of the hydrodynamic experiments at their flume last winter. The report of the tests makes a pamphlet of eighty pages, containing illustrations of the flume and cuts of thirty or forty different wheels.

The method of testing a wheel on a horizontal shaft, and the experiment with draft tubes and belts and gears, are also illustrated. In April, 1879, the Water Power Company sent notices to turbine makers to forward wheels to be tested. The trial began in September of that year, but the tests continued through the winter and spring. Engineers T. G. Ellis of Hartford, Conn., and Samuel Webber of Manchester, N. H., witnessed the tests, and their reports are in the book, but the mechanical work of setting the wheels and making the experiments was superintended by James Emerson, who had much previous experience in testing turbines. Mr. Emerson's figures were verified by one or the other of the engineers. The experiments were competitive as regards economy in the use of water, cost, durability, etc. The company find that there has been the most gain in the efficiency of the turbines economical at partial gate, and ranging from half to full gate. Some of the principal wheels gave the following results at from one-half to full gate, the figures representing the average percentage of useful effect of water used on the wheel: "Hercules," made by the Holyoke Machine Company, 771; "New American," Stout, Mills & Temple, Dayton, O., 768; "Success," S. M. Smith, York, Pa., 747; "Tyler," John Tyler, Claremont, N. H., 716; "Tait," Thomas Tait, Rochester, N. Y., 713; "Thompson," Thompson Iron Works, Union City, Pa., 709; "Nonesuch," A. S. Clark, Turner's Falls, 666; "Houston," Fales & Jenks Machine Company, Pawtucket, R. I., 657. The "Victor," made by the Stilwell & Bierce Manufacturing Company, of Dayton, O., the "Richard," by George F. Baugher, of York, Pa., and others gave good results, but the above eight wheels are all whose averages were worked out by the engineers. The experiments with draft tubes were not favorable to that method of setting wheels. The theory is that the water will exert the same force as

when the wheel is set in the ordinary way, but the trials showed as high a difference as 34 horse-power in favor of the wheel placed at the bottom of the flume. In the experiments to ascertain the amount of loss of power through gears and shafting, an astonishing loss was discovered in spur gears, but the same results were found after repeated trials on several days.

MAKING STEEL FOR LESS THAN THE PRICE OF THE IRON OF WHICH IT IS MADE.—Mr. James Henderson, of New York, writes to the *American Manufacturer* the details of a process which he claims as his own, and which he terms the fluorine and oxides, preferably fluorspar and iron ore, finely pulverized, and applied as a covering to the bottom of the apparatus in which the cast iron is converted. It may also be applied as a dust, injected into the metal as in the Bessemer process. The claim for this process is that these agents form a chemical combination with themselves, and with the impurities in the crude metal at the same moment, and remove the silicon and phosphorus, so that the metal becomes steel by the time the carbon is reduced to one per cent., and that cast steel for tools is thus formed. Mr. Henderson claims to evade any steel patent, also that the process is economical with all kinds of iron, that good pig iron produces more and better steel than is produced without it, and inferior pig iron produces steel suitable for uses, such as rails, for which puddled iron is generally applied. In general, the object of this combination is to extract the phosphorus and sell it, and he claims to be able to extract phosphorus enough to make the steel cost less than the pig iron originally cost. Whether Mr. Henderson ever realizes all that he anticipates or not, only a thorough trial upon a large scale will determine. If he should succeed, however, in reducing the cost of steel materially, the process will be invaluable.

PRESERVED AUSTRALIAN RABBITS.—The Australian Meat Preserving Companies, which have, during the last year or two, taken to cooking and "preserving" rabbits which have been killed in such enormous numbers, have found their resources unequal to the task of boiling and tinning in a fresh state all the rabbits which have been offered to them. The Colac Preserving Company, for instance, whose works are situated about ninety miles from Melbourne, had, on an average, 7,000 of these rodents brought in every night for the first four nights of the past season's operations. How the supply would have increased as the season advanced it is impossible to say, but orders were given to limit the daily quantity to 2,700 pairs. This number cooked and "canned" for five days a week and during a season of twenty-five weeks gave 675,000 rabbits as the return for one establishment—a quantity which is 50 per cent. more than was dealt with in the season of 1879.

CHANGE OF SEED WHEAT.—We have often urged upon the farmers of the State the necessity of changing their seed wheat. In a conversation recently with Major A. G. Wilcox, who owns several large farms out on the line of the St. Paul, Minneapolis & Manitoba Railroad in Swift County, he informed us that last season he purchased a car-load of wheat in Winnipeg, and sowed it on one of his farms. The result was that, last fall, when he threshed his wheat, the ground which was sowed with the seed from the British province yielded five bushels more to the acre than that which was seeded with choice plump wheat raised in the neighborhood of his farm. The land, the cultivation and the harvest were all alike. This shows what virtue there is in obtaining seed wheat from a distance. We trust our wheat-growers will notice this experiment, and improve on it.—*Minneapolis Tribune*.

# THE UNITED STATES MILLER.

## UNITED STATES MILLER.

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MILWAUKEE, JANUARY, 1881.

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We send out monthly a large number of sample copies of THE UNITED STATES MILLER to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. Send us one dollar in money or stamps, and we will send THE MILLER to you for one year.

### MILLERS' DIRECTORY FOR 1880.

All mill-furnishers, flour brokers or other parties desiring to reach the flour mill owners and millwrights of the United States and Canada, should have a copy of the above named work. It contains about 15,600 names with Post-office addresses, and in many cases (notably in Wisconsin and Minnesota) gives the number of runs of stone, sets of rollers, and kind of power used, or the capacity in barrels. A limited number of copies only have been printed. Upwards of 75 of the leading mill-furnishing houses and flour brokers in this country and several in Europe have already secured copies. Send in your orders at once. Price Five Dollars, on receipt of which Directory will be forwarded post-paid by mail, registered. Address

UNITED STATES MILLER,  
MILWAUKEE, WIS.

The United States Consuls in various parts of the world who receive this paper, will please oblige the publishers and manufacturers advertising therein, by placing it in their offices where it can be seen by those parties seeking such information as it may contain. We shall be highly gratified to receive communications for publication from Consuls or Consular Agents everywhere, and we believe that such letters will be read with interest, and will be highly appreciated.

SUBSCRIBE for the U. S. MILLER.

THE COCKLE SEPARATOR MANUFACTURING CO., of Milwaukee, have just issued a neat new catalogue. It will be sent to any address free upon application.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. You will thereby oblige not only this paper, but the advertisers.

OUR thousands of readers will be gratified to have the opportunity of reading a lengthy communication on pages 40 and 41 on the subject of roller mills, from the pen of Mr. W. D. Gray, milling engineer. There are few millwrights in this country whose opinion is held in such high estimation as is his. We advise all to read the article carefully.

THE W. P. McLaren Co., of Milwaukee and Chicago, extensive grain dealers, have been obliged by the decline in the price of grain to suspend. This company has long been considered amongst our strong ones. It is hoped that such arrangements may be effected as to enable them to speedily resume business.

IT is scarcely necessary to call attention to the magnificent advertisement of Messrs. E. P. Allis & Co. It speaks for itself. This firm is crowded with orders from all parts of this country and enjoys frequent orders from beyond the seas. The prospects with them for business for 1881 is extremely flattering.

BUG BREAD.—In Mexico the eggs of a water bug are deposited in immense quantities on the sedges and other plants that grow in ponds. The eggs are collected by the Indians and made into a cake which is used as food by the Mexican Indians, who are very fond of them.

WE enclose a subscription blank in our entire edition this month, and we hope that many will avail themselves of this opportunity to subscribe. Commence with the New Year. You cannot spend a dollar to better advantage than by spending it for a year's subscription to this paper.

HOT BEARINGS.—It has long been known that sulphur cools a hot bearing, but the reason why is doubtful. Van Heeren states that the fine metal dust formed when a journal runs hot and which strongly acts upon both journals and bearing, forms a sulphide with the sulphur. This compound, which grows soft and greasy, does not cause any appreciable amount of friction. Sulphur and grease in combination are in regular use on board the steamers of the North German Lloyds.

#### Canadian Taffy for Johnny Bull.

For the amusement of the members of our Millers' National Association, and for millers in general, we take this occasion to reproduce an article from an obscure Canadian sheet with a long name, which has been brought to notice in many quarters by being copied by *The Miller*, London. That the Millers' National Association is "nothing more than a gigantic Ring," will be news to those who have and those who have not become members.

Editorially, *The Miller* rather questions the truth of the matter treated of in the article set forth in the Canadian sheet, as well it may. That American millers have a desire to manufacture as much flour as possible so long as they can sell it at a profit, no one will deny, but that the National Association has anything to do with a "pool" for magnificent transactions in flour exports is simply "taffy." The following is the article referred to:

"American millers doing an export trade have not found the business a very profitable one during the past eighteen months, as the President of the American Millers' Association said at Cincinnati in June: 'The miller's bank account, as a rule, is somewhat more attenuated than it was a year ago.' The principal reason, from an American point of view, to be given for these losses is that the price of wheat, owing to the manipulations of Mr. King's defunct wheat ring, was relatively higher during long periods of the past two years than flour. The question which presents itself prominently to English millers is, will the American flour trade continue to compete as strongly as heretofore in face of probable losses (arising principally from the efforts of a wealthy clique again endeavoring to control the wheat market) in the markets of the United Kingdom? For the several reasons here given it may be expected that American millers have been educated up to the belief, which upon every conceivable opportunity is impressed upon them, that the sole, undivided and uncontrollable right of receiving the profit which accrues in the process of turning the vast quantities of raw material (wheat) into the manufactured article (flour) should be theirs, and, with this end in view, have instituted millers' associations in almost every county in every State of the Union. The county or district associations are under the control of the State association; the State association consists mainly of delegates from

county associations; the State association sends delegates to the ruling spirit of the affair, which is the National Association of American Millers, and it is under the guidance of the National Association that the onslaught on British markets will be continued. All millers connected with the Association, who either export flour direct or through the agency of commission men to any market outside the United States, are required to render to the head of their district association a sworn statement setting forth the quantity so exported together with the net cost of the product at the mill, and they are also required, upon receiving returns of sales, to send in a certified copy of same. All these statements are forwarded to the National Association, where the profits and losses on such sales are monthly computed. Those who have lost on their shipments are recompensed to within 70 per cent of their loss by *pro rata* assessments on the shipments which turned out profitably. In the event of the assessments not being sufficient to meet the losses, assessments are levied on the state organizations, which make good the deficiency. The National Association of American Millers is nothing more than a gigantic "ring," an institution not peculiar to Americans, for English merchants in the early days of free trade set the example, which Americans are now profitably following, of selling their commodities cheaper in foreign than in home markets, for the purpose of eventually securing the entire control of the trade. Then again, the better qualities of American flour, like the better qualities of American wheat, are kept in the country, and it is positively necessary, under the patent process system of manufacturing flour, to have a market outside the United States where the secondary qualities can be got rid of. Great Britain affords, at present, that market. The patent process system of manufacturing flour, when stripped of technicalities, is extraordinarily simple. The best flour used to be made in the Middle States from winter wheat, as spring wheat yielded much less flour from a given quantity, and enough bran could not be extracted by bolting to give it a good color. In the old-fashioned way the spring wheat would be ground and then bolted; in the refuse (the bran and middlings) would be included a large proportion of the weight, and this refuse used to be sold for feed, but now the best flour is made from the refuse.

Under the new process system the wheat is ground in about pretty much the same way as before; the first result is ordinary flour, which is exported, then the bran and middlings (the wheat on going through the stones for the first time is ground course) are reground and then put into large horizontal sieves, and while agitation is going on an ingenious system of draft is rushing up through, carrying off the bran, etc. What is left is the glutinous portion of the wheat, the most nutritious and most productive. For this class of flour there is a large and ready market in the Northern and Eastern States; not one barrel in ten thousand leaves America. The result of the discovery of the patent process system has been to make spring wheat grades more valuable than the winter growths, and is one of the chief reasons for the enormous expansion during late years of the milling business in the Northwestern States.

As the cultivated areas of Minnesota, Dakota and Manitoba expand, the growth of spring wheat will proportionately increase, and additional milling power will be established throughout the Northwest; and it is quite certain every one of the mills will manufacture by the patent process system, which means that in every succeeding year England will receive the low grades of flour in greater quantities than before. The exports of flour from the United States to the United Kingdom for the last four years, each year ending on June 30th, are here given:

1876 7 equal to	918,283 barrels of 196 lbs.
1877 8 "	1,615,470 "
1878 9 "	8,030,065 "
1879 80 "	4,471,023 "

Now suppose a corresponding increase goes on in future years, long before the end of the present century Great Britain will receive her breadstuffs supply—in flour—from the United States. Is this desirable? Let some statistician estimate the amount of capital which would be thrown out of employment should the milling trade of the United Kingdom collapse; let him find out how many men who are directly employed in this trade would be thrown out of work; let him find out the amount of indirect capital and labor which would be left unemployed by mill furnishers and others; then let him estimate the depressing effect on England's general trade should the spending power of this army of mill opera-

tives suddenly cease. Surely a trade in which many men have made large fortunes is worth retaining. There are two ways to secure this end. First, let millers (any number may, if the expense appears too great, club together) have representatives on this Continent to buy and ship the qualities of wheat required. Any English miller turning out one thousand sacks of flour per week would be surprised at the saving effected by this arrangement. You are now taking the inferior qualities of American wheat, wheat which an American miller would refuse to use. Nine out of ten cargoes of No. 2 spring offered for sale off-coast would hardly inspect No. 3 in Milwaukee or Chicago, and yet these are as fine qualities of wheat as any miller wants to use grown in any of the Western States, and which would be laid down in England at or below the prices demanded for inferior qualities. The one thing necessary is to secure the services of a man thoroughly acquainted with American wheat-producing centres, and one who is thoroughly conversant with the through freight tariff of American railroads.

### Grain Trade Notes.

DECEMBER 29, 1880.

Milwaukee warehouses are at present stored with 2,551,782 bushels of wheat, 33,672 bushels of corn, 78,084 bushels of oats, 59,680 bushels of rye and 59,680 bushels of barley.

Chicago elevators, as per official figures, contain 7,175,062 bushels of wheat, 4,760,684 bushels of corn, 1,472,810 bushels of oats, 298,386 bushels of rye, and 275,197 bushels of barley, making a grand total of 18,982,139 bushels, against 18,588,249 bushels a week ago, and 18,000,590 bushels at this period last year. In addition to the above, vessels in the Chicago river are laden with 500,000 bushels.

Last year at this time there were 20 elevators in Chicago, with a capacity for storing 16,955,000 bushels of grain. This year there are 22 elevators, with a capacity for storing 20,955,000 bushels.

The receipts of flour, grain, live hogs and lumber at Chicago from January 1 to date in the years named were: In 1880—Flour, 3,278,041 barrels; grain, 146,583,440 bushels; live hogs, 6,994,966 head; lumber, 1,553,078,000 feet. In 1879—Flour, 3,391,288 barrels; grain, 119,189,375 bushels; live hogs, 6,407,964 head; lumber, 1,479,682,000 feet.

The exports direct to Europe from Chicago, since January 1, include 309,802 barrels of flour, 2,177,780 bushels of wheat, 7,589,926 bushels of corn, 31,140 bushels of oats and 2,043 bushels of rye.

New York and Brooklyn ware-houses contain 5,798,000 bushels of wheat, 2,884,000 bushels of corn, 820,000 bushels of oats, 220,000 bushels of rye, and 198,000 bushels of barley.

Grain in sight in the States and Canada on the 18th instant: Wheat, 29,700,000 bushels; corn, 16,465,000 bushels; oats, 8,788,000 bushels; rye, 941,000 bushels; barley, 3,058,000 bushels, making a total of 58,965,000 bushels, against 52,145,000 bushels on the 11th instant, and 49,648,000 on January 8, 1880.

Exports from seaboard ports last week: Flour, 161,521 barrels; wheat, 1,542,790 bushels; corn, 682,096 bushels; oats, 1,320 bushels; rye, 85,811 bushels; pork, 8,620 barrels; lard, 4,601,584 pounds; bacon, 14,818,200 pounds.

The foreign exports from the principal seaboard ports from January 1 to December 26, 1880, foot up 6,004,747 barrels of flour, 110,286,808 bushels of wheat, 96,818,216 bushels corn, 641,093 bushels of oats, 2,244,641 bushels of rye, 293,009 bushels of barley, 391,851 barrels of pork, 374,598,720 pounds of lard and 759,652,350 pounds of bacon.

The report of Gen. Walker, the Superintendent of the Tenth Federal Census, gives a very gratifying statement of the work being done in the collection of statistics of manufacturing. In all, 365 special agents have been employed in 276 cities and towns, and reports are now completed from all but 16 of the largest places, where the investigation is proceeding satisfactorily, and it is hoped will be finished this month. The experience of ten years since the increased force authorized, and the improvement in the system, warrant us in supposing that we shall now have statistics of some value in this connection. It is certain that in the discussion of the question which will be sure to arise in the next decade, the information thus furnished will afford a basis for correct conclusions such as we have never before had.

## NEWS.

## EVERYBODY READS THIS.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

Ward Bros. will build a mill at Harding, Minn.

J. S. Wagner is building a 4-run mill at Cooperstown, Pa.

Baltimore's storage capacity is now placed at 3,350,000 bushels.

Hobart's mill at Crook City, D. T., burned Dec. 12. Loss \$7,500.

Several Texas flouring mills have been changed into cotton mills this year.

The ground is being broken for the erection of flouring mills at Thomson, Minn.

A 7-run flouring mill is about to be erected by a stock company at Rich Hill, Mo.

2,400,000 bushels of wheat were purchased by Minnesota parties during November.

Important discoveries of petroleum have been made in Venezuela, South America.

Renslow & Mason are now the proprietors of the Reidell Mills, at Owatonna, Minn.

A. J. Brown's mill at Ludlow, Vt., was recently damaged by fire to the extent of \$2,000.

The Red Wing Milling Co., Red Wing, Minn., turn out 1,000 barrels of flour per day.

Low water and lack of freight cars are the troubles which afflict Minneapolis millers now.

H. A. Doty's feed mill in Janesville, Wis., has been burned. Loss \$10,000. Insurance \$2,500.

F. Goodnow & Co., of Salina, Ks., have an order for 3,000 barrels of flour for export direct to London.

9,736 tons of dried yeast were imported into Great Britain during the past year, valued at £508,000.

Messrs. Smith Bros., of Milwaukee, have finished the mill for Anton Klaus, at Jamestown, D. T.

Messrs. Smith Bros., of Milwaukee, have just built a mill for the Government at Ft. Folten, Dakota.

The Zenith, Phoenix and North Star mills at Minneapolis have shut down to put in more new machinery.

D. J. Miner's mill at Freehold, N. Y., was recently destroyed by fire. Loss \$5,000. Insurance \$1,000.

The Washburn A mill at Minneapolis will, all completed, have a capacity of 3,500 barrels per day of 24 hours.

A great many mills in Great Britain are being entirely remodeled, some of them on the latest American plan.

A company in Antwerp, Belgium, will invest about \$600,000 in grain elevators, built on the American plan.

Louisiana's rice crop for 1880 is estimated at 250,000 barrels, an increase of 150,000 barrels over the crop in 1879.

Messrs. Smith Bros., of Milwaukee, have completed the rebuilding of the Los Gatos Flour Mills, at Los Gatos, Cal.

It is estimated that there are now in store in the warehouses of Dakota, Iowa and Minnesota and awaiting shipment 8,780,000 bushels of wheat.

The receipts of flour at Cincinnati for the year ending Aug. 31, 1880, were 771,900 barrels, against 618,914 barrels for a similar period in 1879.

Messrs. Smith Bros., of Milwaukee, have the contract for furnishing and placing the machinery in a Chicago, Milwaukee & St. Paul elevator in Iowa.

The Minnesota millers are again talking up a mutual insurance company, and the Legislature will be called upon this winter for the necessary legislation.

The Oregon wheat surplus, which is immense this year, and, in proportion, almost as extraordinary as that of California, has hardly been touched.

Messrs. Smith Bros., of Milwaukee, report business lively, and that they are crowded with millwrighting work of every description for both flour mills and breweries.

Austin & Worden will rebuild their mill, that was burned down at Minnesota Falls, Minn. It will be fitted up with the roller system, with a capacity of 125 barrels.

Dr. Glenn's harvest in Colusa county, Cal., is just finished, and the total yield is 460,000 sacks of wheat. The doctor reserves 60,000 sacks for seed, and has shipped the rest.

J. L. Dunham & Co., of Depere, Wis., have just completed the changes in their mill. They

have eight sets of rolls and twelve of stone. Capacity, 150 barrels daily—waterpower.

Van Valkenburg & Arndt have remodeled their mill at Depere, Wis. They now have ten sets of rollers, three runs of stone, and capacity of 200 barrels daily—waterpower.

Alex. Waer's flouring mill in Lapeer, Mich., burned December 22. Loss, \$25,000; insurance, \$10,000, in the Millers' National, and \$5,000 in the North American Insurance Companies.

Minneapolis millers are complaining about the mixed quality of wheat they have been receiving of late. Minnesota farmers are urged to take great pains to secure good, clear, hard wheat for seed.

Another German miller has been sentenced to fine and imprisonment for selling flour adulterated with 36 per cent of sulphate of barium. Verily, he was not "von of dose 'onest Dutch sellers."

The Australian wheat crop which is now being harvested, will employ all the vessels available in foreign ports, and charters are being made there at the rate of 60s for the shorter voyage from Adelaide to Great Britain.

The Atlantic Milling Co., of St. Louis, of which Geo. Bain is President, has purchased a lot north of the "Atlantic Mill," 185 by 165 feet. It is suggested that Mr. Bain intends to put up a splendid mill on this new purchase.

Fifty-eight national banks were organized during the past year; 5 have failed and 21 went into voluntary liquidation, leaving an increase for the year of 82 banks. The total number of national banks now doing business is 2,102.

The Jonathan Mill Gradual Reduction system has been introduced in Jewell Bros. Brooklyn City Mills, Brooklyn, N. Y. The mills will have a capacity of 800 barrels per day. They use 27 purifiers, 13 sets smooth rolls and 15 gradual reduction machines.

**BURNED.**—The Walnut Valley elevator and Bonanza Mills, owned by E. K. White, at Eldorado, Kansas, burned Dec. 2. Ten thousand bushels of wheat and several thousands of corn were destroyed. The loss is placed at about \$20,000, with very little insurance.

We are pleased to learn that Mr. Henry C. Yaeger, the former proprietor of the Yaeger Mills of St. Louis, which were destroyed by fire some time ago, has just started up a new mill at Kane, Ill. Mr. Yaeger's countless friends will wish him unbounded prosperity.

The Great Western Manufacturing Co., of Leavenworth, Kan., have just completed a new brick machine shop, 150 by 75 feet, and three stories high. They have added a number of new machines, and write us that they are still running day and night to complete contracts.

The network of Japanese railroads is being rapidly extended. Two lines have recently been completed in the Island of Nippo, and another at Yesso, lying in the extreme north of the Japanese Archipelago. The rails used in the construction of these roads were manufactured in England and the locomotives in the United States.

In Baltimore the number of flouring and grist mills is six; greatest number of hands employed, 111; total yearly wages paid, \$38,418; value of material used yearly, \$1,227,158; value of product, \$1,373,109; number of boilers used, 13; number of engines, 7; total horse power, 680.

About thirty feet of the dam across the lake at Badger State Mills, at Eau Claire, Wis., went out on the night of December 19, but as the ground was frozen so hard its progress was very slow, and the prompt measures taken by Mr. Chinn prevented any further damage. Mr. Chinn estimates the damage already done at \$500, but does not anticipate any more.

The Plamondon Manufacturing Company, Chicago, manufacturers of mill machinery, shafting, pulleys, hangers, etc., have added new machinery to their works in the way of four new lathes. They are busily engaged constructing the machinery for a number of flour mills on an entirely new principle, and have within the past two months increased their working force to 100 men.

A singular accident recently occurred at Palmer's flouring mill at Shiawassee, Mich. O. Thomas, the engineer, while attempting to tighten a bolt in the engine shaft was caught by the clothing in the machinery in some unaccountable way, and buried over the engine and left standing on his feet, with no other apparel than his cap and boots, his clothing being torn completely to shreds.

The books of the Secretary of the St. Louis Merchants' Exchange, show that during the past year there has been sold at regular call on 'Change, over eighteen and a half million bushels of cash grain, and a trifle less than eighty-five million bushels for the future. The future sales of option deals made on the floor of the Exchange outside of the sales at call will aggregate fully five hundred million bushels for the same period.

The Pillsbury A mill, at Minneapolis, is to be topped off with a forty-foot flag staff, still above which will be placed a weather vane eighteen feet high. The arrow which forms the vane will be eighteen feet long, and the points of the compass will be indicated by arrows nine feet in length, with letters twenty inches square, while a golden flour barrel placed on top of the flag staff will indicate the character and object of the great structure. The height from the ground to the top of the weather vane will be 188 feet.

One of the most conspicuous and successful new enterprises in Kansas City, Mo., is the Zenith Flour Mills. Its proprietors are active young Pennsylvanians who came amongst us last spring and have erected on the Chicago and Alton railroad, at First and Troost ave., the finest brick mill in the city. It has six run of stones and is capable of turning out 200 bbls of flour per day. The mill is now running night and day and large quantities of its flour is being shipped east, west and south.—*Ex.*

The foundations for a mammoth glucose factory to be occupied by the Chicago Sugar Refining Company, situate upon West Taylor street, between the river and the car tracks of the Chicago & Alton railroad, is so far progressed that a good idea can be had of the immense size of the structure. These works cover an area of some seven acres, comprising two main buildings and six smaller ones, the largest of which will be 160 feet square in extent, and eleven stories and basement in height. The second building will be 10 stories and basement high, and 70x130 feet in size.

The company have about 200 men employed night and day, and it is the intention of the proprietors to have the building ready for occupancy about July next.

Near Rugby, Tenn., Thomas Hughes' English colony, there is a primitive water mill called Buck's Mill, which was run by the owner for years—until he sold it a few months ago—on the following system. He put the running gear and stones up, and above the latter a wooden box, with the charge for grinding meal marked outside. He visited the mill once a fortnight, looked to the machinery and took away whatever coin was in the box. Folks brought their corn down the steep bank if they choose, ground it at their leisure, and then, if they were honest, put the fee in the box; if not, they went off with their meal, and a consciousness that they were rogues. Buck probably found his plan answer, as he pursued it up to the date of sale.

The village of Geneva, Kane county, Ill., has recently added to its manufacturing industries a glucose factory, which is now in successful operation, consuming 1,000 bushels of shelled corn per day. The works have cost about \$125,000. The process of manufacture is as follows: The corn is first ground and soaked in pure water. It is then passed over several shelves and through rollers to extract all the moisture and starch. From the rollers it passes into large vats, and is there boiled until reduced to starch, pure and white. It is taken in the starch form from the vats, and by a chemical and purifying process is converted into corn sugar or glucose. The refuse or crushed corn, left after the rolling process, is sold to the farmers for feed, commanding not less than \$3 per ton.

The Northwestern Miller, of Dec. 17, says: Not content until their last mill has been overhauled and changed to the roller system, Messrs. C. A. Pillsbury & Co. are preparing to give their "Pillsbury" a most thorough renovation, tearing out everything but the walls, and, in fact, making a new mill of it. The fact that Henry Crossen is drawing the plans is sufficient to insure a model concern of it. Like the Empire mill, it will be mainly furnished with Downton rolls, enough of which, with six of its thirteen run of stone, will be employed to give it a daily capacity of between 700 and 800 barrels of flour. The "Pillsbury" mill is the one with which Mr. C. A. Pillsbury first embarked in the milling business in this city, and is consequently one of the oldest on the Falls. To show to what gigantic proportions this comparatively small starting has grown, it is only necessary to cite the fact that this firm now operates four large mills—the Anchor, Empire, Excelsior and Pillsbury—each of which turn out over five hundred

barrels of flour per day. When they have completed the mammoth Pillsbury A mill on the East side, for which they claim a capacity of four thousand barrels, Messrs. C. A. Pillsbury & Co. will be the largest flour manufacturing firm in the world, having a total capacity of six thousand barrels a day.

**PASSENGERS MUST HAVE SEATS.**—The Rhode Island supreme court was occupied last week with a matter of interest to all classes of travelers. Last September Mr. Frank W. Trainor of this city took the Shore line train from Boston for Providence. The cars were crowded, and, when Conductor Eagan came through the train to collect the tickets, Mr. Trainor refused to surrender his pasteboard until a seat was furnished him. The conductor exerted himself to find a seat, but the only one he was able to find was one a portion of which was occupied by an other man whose looks Trainor objected to; at least, he was dissatisfied with the seat, and still declined to give up his ticket. There was some further effort made to secure accomodations for him, but with little success. When the train arrived in Providence, Mr. Eagan called the night police officer, Mr. Hansom, and Trainor was taken into custody. He spent the night in a cell at the police station, and was discharged the following morning. Subsequently he brought an action of trespass to recover damages for an assault committed upon him by Conductor Eagan and Officer Hansom. Considerable testimony was heard on both sides, but the jury, after being out some time, brought in a verdict for the plaintiff of \$250.

**"CHALK YOUR HAT."**—The cant phrase, "Chalk your hat," which is still current in many parts of the Union, is said to have had its origin in a literal illustration of the words. "Admiral" Reeside was an owner of various stage coaches in the days before railroads. He spent much of his time in Washington, where, indeed, he lived for several years. At the annual adjournment of Congress he would pass his friends of the House and Senate—he was well acquainted with all the prominent politicians of his era—over any stage line he controlled. He would say to an Ohioan or Kentuckian: "I suppose you're going back to Cincinnati or Louisville, and I'll pass you through by stage." When he was asked: "How?" he would reply: "Give me your hat." He would take the hat, make a cabalistic chalk-mark on it impossible to counterfeit, and return it with the remark: "That will serve your turn; any of my agents will recognize that anywhere, and won't receive a cent from the man whose hat is so marked." Reeside was right. All his agents knew the sign at once. The thing became so common that some fellows tried to imitate it, but they were invariably detected and compelled to leave the stage or pay their fare. In the South and West "Chalk your hat" still stands for what the East styles dead-heading.—*New York Times*.

THE British Board of Trade returns show what a tremendous difference the goodness or badness of a harvest makes to the prosperity of a country. The imports of food into Britain in October, 1879, was £14,164,800; in October, 1880, £11,109,400; decrease, £3,602,100, or 21.6 per cent. The decrease is more than half of it in wheat, of which cereal only £1,710,600 was brought in, against £3,522,500 in October, 1879, a decrease of over 50 per cent. The import of live animals increased from £668,700 to £925,500, or nearly 88 per cent. The import of potatoes fell from £499,300 to £93,100.

**A NEW YORK STREET GAMIN.**—"I have a great desire to see one of your street boys," said Thackeray to a gentleman of New York as they walked together. "We shall be likely to meet some of them," said his friend, "see, there's one!" Thackeray drew near the ragamuffin and accosted him, "My lad, I want to go to Chambers street." The young Arab turned a sharp eye on the handsome stranger, delivered a mouthful of yellow fluid to the flagging and answered, "Well, run right along, sonny, only mind you don't be gone too long."

Prof. Huxley declared recently that ninety-nine men out of every one hundred became simply obstructive after sixty years old, and were not flexible enough to yield to the advance of new ideas. The world, he thought, would be benefited by gay men who had taken part in science being strangled after sixty.

Mr. Bryan Corcoran's article on Millstones, corrected and revised, with 17 illustrations, will appear in our next number.

## THE UNITED STATES MILLER.

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E. HARRISON CAWKER, EDITOR.

PUBLISHED MONTHLY.

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Foreign Subscriptions..... 1.50

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Bills for advertising will be sent monthly unless otherwise agreed upon.

For estimates for advertising address the UNITED STATES MILLER.

[Entered at the Post Office at Milwaukee, Wis., as second-class matter.]

MILWAUKEE, JANUARY, 1881.

SUBSCRIBE for the U. S. MILLER. Only \$1 per year.

We wish our readers one and all a HAPPY NEW YEAR.

DEALERS in milling supplies of all kinds should advertise in the UNITED STATES MILLER.

MILLERS are much troubled now-a-days because freights are so backward in going forward.

A NATIONAL bankrupt law is greatly needed and it is probable that the national legislature will soon furnish one.

MANUFACTURERS of any article used in a flouring mill should make use of the advertising columns of the UNITED STATES MILLER. It will pay.

IN ORDER to demonstrate what might be done in the way of corn raising, Mr. Nathan G. Price raised from one acre of ground during the present year, 110 bushels of shelled corn.

PARTIES desiring to sell or buy a mill, or get a situation in a mill, or in want of a miller or journeyman millwright, should make their wants known through the columns of the UNITED STATES MILLER.

FREIGHT cars are loaded much heavier than in former times. Car loads of ore have been drawn weighing 48,500 pounds. The present average weight of a car of heavy freight is not less than 25,000 pounds.

THE ENORMOUS freight traffic over the New York Central road may be considered when it is stated upon undoubted authority that in a single month 57,000 loaded freight cars went East and 54,000 went West.

MILLERS desiring to purchase any article used in flouring mills, can find where it can be obtained by addressing parties advertising in this paper. When you write to them, be sure and mention that you saw their advertisement in the UNITED STATES MILLER.

AS AN inducement to millers to establish business in Louisiana, that State exempts from taxation the milling property of all mill-owners whose plant employs five persons or more. We believe that there are many points in that State where milling could be made a profitable business.

THE JETTIES of the Mississippi have proved to be a perfect success. Nov. 17 the Dominion line steamer Montreal, bound for Liverpool, passed the jetties with the largest cargo ever taken from New Orleans, consisting of 6,669 bales of cotton, 48,658 bushels of corn, and 2,000 packages of miscellaneous cargo.

A SECTION in the United States Revised Statutes forbids the marking of an unpatented article with the word "patent." In a case in Oregon (Olyphant vs. Salem Flouring Mills) Judge Deady held that the act of branding flour "patent," was a violation of the law even though the machinery with which the flour was made was patented. The sooner millers quit branding flour "Patent," the better.

WIRE ROPES FOR THE GREAT BRIDGE IN NEW YORK.—Each rope is 4,550 feet in length, three inches in diameter, and their aggregate weight is 102,495 pounds. Each rope is made in seven strands. The central strand has 49 No. 11 wires, and the six strands enveloping this have 19 wires each, of No. 4, 5, and 7 gauge, making 163 wires in all. The strength must equal 160,000 pounds per square inch cross-section.

AN English gentleman recently in this country said to us, that many of the English millers who were now remodelling their mills were putting in just such machinery as our

millers here who are remodelling their mills are throwing out, and that when he returned he was going to tell them they could save money by buying the discarded machinery at second-hand prices of our millers if they were going to carry out their present plans, but that they had better put in at once our latest new process roller system.

MINNEAPOLIS is now undoubtedly the largest milling centre in the world. St. Louis has lost two important mills during the year 1880. August 17th the Yaeger Mills, which produced in the year 1879, 828,724 barrels of flour, was burned, and on December 23d, 1880, the Pacific Mills, which produced in 1879, 152,141 barrels, was burned. This reduces the milling capacity of St. Louis, 480,875 barrels in one year. On the other hand, many additions have been made to other mills increasing their capacity, but no where near enough to compensate for the great loss entailed by the destruction of these two mills. Next to Minneapolis our own fair city of Milwaukee claims to rank as a milling centre.

## Books Received.

*Annual Report of Inspector General of Steam Vessels, U. S. A.* From the United States Treasury Department.

*Commercial Relations of the United States.* From the Department of State. Vols. I. and II. This constitutes one of the most valuable publications ever issued by the State Department.

*Consular Reports on Commerce and Manufactures, etc.* Nos. 1 and 2. From the State Department. These works will greatly aid our manufacturers and merchants in extending our foreign trade.

GEN. C. C. Washburn visited our city recently, and in a conversation said that he believed the mills of Minneapolis would grind 22 million bushels of hard spring wheat during the year 1881. Minneapolis millers are now universally using roller mills. Eastern mills can no longer compete with Minnesota mills for the reason that they cannot obtain the proper quality of wheat. All the hard wheat which reaches Chicago is mixed with soft to grade it up, and consequently millers there or east of there cannot get the same quality of wheat, all alike in its nature to make the best grades of what is known to the trade as Patent flour. Minneapolis flour can be delivered in Great Britain for \$1.20 per barrel above its cost in Minneapolis. Minneapolis millers are taking steps to improve their transportation facilities, so as to transport their produce in as direct and short a line as possible, and as soon as the arrangements are perfected, but little flour will go East by way of Chicago. Gen. Washburn speaks proudly as well he may of the great progress of Minneapolis in the milling industry. Minneapolis is now the greatest milling centre in the world.

## The Presidents Message.

Congress has assembled and the President has communicated his annual message. The reports from the various governmental departments show that we are at peace with all nations and that our internal affairs are generally in a prosperous condition. President Hayes advises that the coinage of silver be stopped and that the greenback currency be retired. It is probable that the coinage of silver will be restricted, but any effort to secure the reduction of the amount of greenback currency now in circulation will meet with vigorous opposition.

President Hayes recommends that Gen. Grant be made Captain General of the Army. It seems likely that something of the kind will be done and probably without any great amount of opposition. The President still advocates his theory of civil service, but as long as human nature is as it is, victors will not only claim but secure the spoils, and members of congress and senators will not conspire to cut off from themselves the power they may enjoy by the distribution of offices to their adherents in their respective districts.

The President takes up the Mormon question at considerable length and desires to have Mormonism thoroughly abolished at any cost. President Hayes is to be congratulated in having enjoyed a peaceful and prosperous administration.

We will send a copy of the MILLERS' TEXT BOOK, by J. McLEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for \$1.25. Price of Text Book alone, 80 cents. Send cash or stamps.

## Personal.

Mr. Wm. Richmond, of Lockport, N. Y., manufacturer of milling machinery, has been in Milwaukee some days on business.

The milling firm formerly White, Listman & Co., of LaCrosse, Wis., will hereafter be known as Wm. Listman. Mr. G. Van Steenwyk and Mr. C. L. Colman are special partners, contributing to the copartnership \$20,000 each.

Mr. H. Watters is now the resident agent at Fargo, Dakota, of the mill-building firm of Hubert & Paige, of Painesville, Ohio. This firm has established a large and prosperous business in this prosperous northwestern Territory.

Ex-Gov. John Bidwell, a flour-mill owner and great land owner, residing at Chico, Cal., is a candidate for United States Senator from that State. Gen. Bidwell is reported to be worth over a million dollars. He owns one of the finest estates in California.

Messrs. Thomas & Stone, publishers of the *St. Louis Miller*, paid Milwaukee a short visit during the early part of the month. These gentlemen own a good paper, and justly feel proud of it. The *St. Louis Miller* is now in its third year, and bids fair to be a stayer.

Albert Hoppin, Esq., the genial editor and proprietor of the *Northwestern Miller*, spent two or three days in the city during the month. We dared him to go over to London and take in the British Millers' Exhibition, but he recalled his experience of the boat excursion at Chicago two years since, and said that he was sometimes troubled with sea-sickness and preferred to be excused.

We acknowledge the receipt of a photograph from Messrs. Simpson & Gault, of Cincinnati, Ohio, which attracted a good deal of attention and provoked much merriment at the expense of the Executive Committee of the Millers' National Association and the Commissioner of the Exhibition. Those who saw it in Cincinnati appreciated it, but words fail us to describe it. We also acknowledge the receipt of "John Gilpin's Ride," illustrated, from the same firm.

THE UNITED STATES Consul at Berdiansk, thus describes the Russian workman: "His wants are few and easily satisfied. He lives in a wretched, unfurnished hovel, possessing but one recommendation, warmth in winter. His bed is a piece of felt and a straw pillow; he has no sheet or other covering. He sleeps in his clothes, and his sheep-skin coat serves him for a quilt. His dress is of common print, and he generally wears it until it drops off from age. A thick sheep-skin coat is his dress in winter and this is seldom taken off during the cold months. His food consists principally of black bread, made from rye, salted, sun-dried fish, cheese of very poor quality, eggs, and occasionally pork; the better class of workmen generally have a noon-day meal of soup made with meat and vegetables. His drink is tea, quass (a kind of weak beer), and vodka, (a very pure and cheap spirit made from rye). Of this spirit large quantities are consumed. His recreation is drinking with its accompaniments, singing and dancing. Such lodging, such food, such clothing, such amusements, are totally unfit for an Englishman or American. Under such circumstances he could not long retain health.

THE GERMAN FLOUR TRADE.—The German milling industry is at last showing some signs of revival. In fine flours the German millers have always supplied the home demand, but middle qualities have till now been imported from Hungary. Recently, however, the imports from Hungary have considerably declined, and German millers are now supplying the home markets with their own products. The flour exports from Austro-Hungary amounted in September of last year to 126,028 metric centners, of which 45,883 centners were dispatched to Germany. In September of the present year, the flour exports from Austro-Hungary amounted to 164,893 centners, of which, however, only 28,573 centners were forwarded to the German markets. The exports to England have, however, increased in great proportions, and these have more than compensated for the decline in the exports to Germany. Many of the Buda-Pesth millers, especially those engaged in the export trade to the U. K., are reported to have themselves been large purchasers of flour, with which to supply the wants of their customers.

A BREWERS' COLLEGE.—At their meeting, held in St. Louis, June, 1879. The United States Brewers' Association appointed a committee to report upon the establishment of a brewing academy. This committee reported

at the convention held in Buffalo, June, 1880, and after some discussion the committee was increased in number and the report re-committed; at the same time a resolution was adopted, offering a prize of \$150 for the best plan for the establishment of a brewing academy. For the purpose of giving effect to this latter resolution, the committee on brewing hereby offer in the name of the United States Brewers' Association, a prize of \$150 for the best essay on the subject of the scientific education of brewers, which shall also contain a scheme for the establishment of a brewing academy, or of a special course of instruction to be furnished by some already existing institution of learning.—*The American Brewer*.

GARLIC.—The garlic is a small onion-like plant which is a peculiar nuisance to millers in Pennsylvania and vicinity. It has a head somewhat like a seed onion and containing seeds about the size of a wheat grain and only a trifle lighter. This seed contains a glutinous material which, in grinding, gums up the pores of the buhrs, necessitating frequent scrubbing of the stone faces. The best dress for grinding garlicy wheat is obtained by cracking them roughly all over the face and dressing them quite open about the eye. Separation of the garlic from the wheat is very difficult, by reason of the similarity in the size and weight of wheat and garlic grains. To manufacture garlicy wheat, it must be cleaned several times, then chopped or half ground. This will break the garlic, which is somewhat softer than the wheat, and allow its gum to diffuse itself through the meal, so as not to close the stones very much in the second grinding. It is better if the chopped grain be allowed to lie a considerable time before second grinding, that the garlic may dry.

DIRECTIONS FOR LACING RUBBER BELTS.—The belts should be placed on the pulleys as tight as possible. This can be done by the use of belt clamps, except in the case of very narrow belts. In all cases the belt should be cut about one-eighth of an inch less than the distance around the pulleys with a tape line. The seam of the belt should always be on the outside. For narrow belts, butt the two ends together, make two rows of holes in each end (thus obtaining a double hold), and lace with lace-leather. For wide belts, put, in addition, on the back, a strong piece of leather or rubber, and sew or rivet it to the belt. If the belt should slip, it should be slightly moistened with boiled linseed oil—animal oil will ruin the belt. If one application does not produce the desired result, repeat until it does. The belts will be greatly improved and their durability increased by coating the surface lightly with a composition made of equal parts of black lead and litharge, mixed with boiled linseed oil and Japan enough to cause it to dry quickly; the effect of this will be to produce a finely polished surface.

THE GREAT EASTERN'S NEW WORK.—The Great Eastern steamship has been definitely chartered for ten years to carry dead meat to the United Kingdom from the American seaboard or the River Plate. It is calculated that from Texas or the Argentine Provinces beef of prime quality can be laid down in England at 3 pence per pound. The promoters of this bold scheme intend to slaughter the cattle on board the great ship as received from day to day, and for this purpose they have secured the services of trained butchers from the slaughter-house of Chicago. The dressed meat will be stored in refrigerators, and it is estimated that 10,000 to 15,000 carcasses of beef, all hung—equal to 3,000 or 4,000 tons of meat—will be shipped each voyage. The result of this enterprise, if successful, will have a far-wider bearing than appears at first sight. It will be watched with much interest by the public, no doubt, for, notwithstanding the large imports of fresh meat we are receiving, retail prices still rule very high. But it will also break down that ring which, while reaping immense profits, keeps almost at famine prices one of the first food requisites of the people.

All the hogs and pigs on Joseph Perrin's ranch, near Grass Valley, Ind., went on a big bender on Wednesday, which happened in this wise: Several casks of native wines had been placed outside of the house and facing the barnyard, and it is supposed that some of the hogs in rubbing against one of the casks knocked out the spigot, and caused the contents to run out. The wine formed a pool in a depression of the ground, and around it all the hogs, little and big, about the premises, to the number of about thirty, congregated and drank their fill, and before any person about the place was aware of what was going on the hogs were as drunk as fiddlers.

**Illinois Millers.**

The seventh annual convention of the Illinois State Millers' Association was held December 1, 1880, in the parlors of the Leland Hotel, Springfield. The attendance was not large. The following, among others, were present:

D. R. Sparks, of Alton, President; C. H. Seybt, of Highland, Secretary; E. C. Kreider, Jacksonville; Henry Schoneman, Carlyle; A. Fredenbogen, St. Charles; W. L. Barnum, Chicago; Phil. Eisenmayer, Summerfield; J. Koenigsmark, Columbia; H. G. Fahs, Olney; W. T. Crow, Cotton Hill; Hon. E. C. Woodward, Shelbyville; F. M. Brickey, Prairie du Rocher; W. H. Davis, Glassford; J. Trull, Macomb; W. P. Grimsley, L. W. Currier, Wm. Brocker, Springfield.

The convention was called to order by the President at 10 A. M. Mr. Seybt, Secretary and Treasurer, submitted his report of the receipts and expenditures for the year, and it was referred to a committee composed of Messrs. Kreider, Davis and Brickey, to be reported upon at the afternoon session. Mr. Siebond was elected a member of the Association. Upon motion, a recess was taken until 2 o'clock P. M.

During the recess, the Association, upon invitation of Judge H. Welton, visited in a body the chamber of the Springfield Board of Trade. Having spent a few pleasant minutes with the business men of the Illinois capitol, the Association was escorted to the new mill of the Springfield Elevator and Milling Co., being thereto invited by Mr. Wm. P. Grimsley, one of the firm. This recent addition to the material prosperity of Springfield is five stories in height, with an area of 78 by 56 feet. It has ten runs of stones, six Geo. T. Smith No. 4 Purifiers, Richmond's Bran Duster, Smith's Dust Rooms, etc. The engine is an Atlas-Corliss, of 200 horse-power. The mill will begin operations January 1, 1881, and will have a capacity of 200 barrels of flour per day. The Elevator and Milling Company is composed of the following gentlemen: S. W. Currier, Wm. Brocker, Wm. P. Grimsley and George Kern.

Upon re-assembling at 2 o'clock P. M., the committee to which was referred the report of the Secretary and Treasurer submitted a report. This showed as follows:

Cash on hand December 1, 1879.....	\$ 615.23
Amount collected to December 1, 1880 .....	3,290.00
Amount of expenditures.....	2,986.00
Cash on hand December 1, 1880.....	324.00

The remainder of the report was as follows:

We, the undersigned committee appointed to examine the report of the Secretary and Treasurer of the Illinois State Millers' Association, for the year ending November 30, 1880, find the same correct, and recommend its adoption. We find that twenty-six firms, owners of 123 runs of buhrs, have not met their assessments, and we recommend that the Secretary be instructed to issue a circular letter to each of the firms, reciting the benefits that have already been reaped by reason of our combination, and the dangers of allowing the Association to die for want of pecuniary support; also calling their attention to the suits now pending against members of the Association by Denchfield and other patent-right men, and urge upon them the importance of prompt payment. [Signed.] E. C. KREIDER,  
F. W. BRICKEY,  
W. H. DAVIS,  
Committee.

The report was adopted.

Mr. Seybt very carefully and ably detailed all the important points regarding the patents now in litigation, and of interest to millers. A recess was then taken until 7 o'clock P. M.

The convention being called to order at 7 o'clock, Mr. Kreider made a motion that an assessment of \$5 per run of buhrs upon all members of the Association be made to defray the expenses of the Association for the ensuing year.

Agreed to.

Mr. Woodward moved that the thanks of the Association be tendered to the officers for the very able manner in which they had performed their very responsible and arduous duties.

Carried by a full standing vote.

The officers of the Association were re-elected for the coming year by acclamation. They are as follows:

President—D. R. Sparks, Alton.

First Vice-President—E. C. Kreider, Jacksonville.

Secretary and Treasurer—C. H. Seybt, Highland.

Executive Committee—C. B. Cole, Chester J. Underwood, Dixon; E. C. Kreider, Jacksonville; F. W. Brickey, Prairie du Rocher; E. R. Sparks, Alton.

On motion, the President narrated his experience with a Cincinnati telephone last June, during the Millers' International Exhibition. The story was received with much laughter and applause, and the Association adjourned until next year.

**On Middlings.****THEIR VALUE AND TREATMENT.**

[A paper by Mr. Frederick Richardson, of Bishopwearmouth Mill, Sunderland, read before the British and Irish millers, November 22, 1880.]

**MR. PRESIDENT, GENTLEMEN, MEMBERS OF THE BRITISH AND IRISH MILLERS' ASSOCIATION—**

It is with some diffidence I stand before you to-day, at the same time I take it as an honor to have been asked to prepare a paper for your consideration. The subject is "Middlings: Their Value and Treatment," or rather their "Treatment and Value."

Now that we have agreed (and wisely so) to make public our meetings, I hope it will be accepted by the general milling trade of this country as a humble effort to try and raise the standard of a manufacture we have all so much at heart.

I will not trouble you with percentages, nor lofty problems of theory, nor the higher flights of mathematics, but simply give you my views and experience of middlings as produced in this country with stones and medium grinding of mostly foreign wheats, also the machines used to purify and reduce the same.

It is not my intention to advocate any particular machines, either purifiers or rollers, as such would be quite without the province of this paper.

Let us first consider the grain we have to manufacture. A grain of wheat consists essentially of three parts: first, the outside hull or bran, composed of layers exhibiting different color, tenacity and composition; second, the germ, a soft, oily substance, very nutritive but fatal to the color of flour; third, starch and gluten. Connected with the latter substance is one of the all absorbing topics of the day, how to separate it from the other two without waste.

That there are impurities amongst middlings, I think no one who has given the slightest attention to his business will fail to admit. Now it is these fibrous particles, which, when mixed with flour and doughed, do not enter into the organic change that the starch and gluten pass through, but serve to destroy fermentation and darken the dough.

I think I am correct when I say that the purification of middlings was known in Austria nearly 100 years ago, at any rate so far back as 1820 machines were made in France, and later on we know that they were made by Perigault, Cabane and others. For many years some of our mill furnishers tried to introduce them into this country, but with little success. It was not until they had been taken up and adopted by our American cousins, and we began to feel the effects of their improved flours, that we woke up and found them indispensable in our mills.

With your kind indulgence and permission, I will take you North for a few minutes while I explain the system of middlings purifying as carried out in our own mills; not that I think we are perfection by any means, but simply to bring my arguments more clearly before you.

I will not trouble you with the routine of cleaning, grinding and bolting, but take you direct to the middlings—in the first place, we

thoroughly dust them through centrifugal reels. As middlings, and also the impurities, differ in size and weight, it is essential they should be differently treated, for this reason we pass them through a sorting reel. Dressing our flour very fine, there are, as a consequence, a considerable quantity of fine middlings; these pass through the head sheet No. 9 or 10, and are rolled without purifying.

I have not yet seen a machine that will treat such without waste, in fact I don't think they require it.

The remainder of reel is covered with No. 8 and No. 6, a six sheet reel. What passes through No. 8 goes to a purifier with a blast under the sieve, that which passes through No. 6 to a machine with both blast and exhaust; the tailings are purified upon a machine having a sieve with four different lower numbers of silk, the middlings passing through them fall over shelves and are subject to an exhaust, which can be regulated to suit each quality. The tailings from this machine pass over a purifier with centrifugal action and exhaust. I should have mentioned that the tailings from No. 1 purifier pass to head of No. 2, No. 2 to No. 8, and so on.

Having made four sizes of middlings, Nos. 1 and 2 are rolled separately, but dressed together in centrifugal machines, the tailings from which, after passing through a detacher, are dusted. The last sheet of this reel is clothed with No. 9 silk. As we again find fine middlings, these are re-rolled, the tailings re-purified, re-rolled, and so on; the other sizes are treated in much the same way.

The floors are kept separately and mixed with the first run as desired.

Some may ask why I prefer a blast machine for fine middlings. Common sense and experience has taught me that with an exhaust you are sure to draw a certain amount of the finer particles into the stive-room, whereas with a blast under the sieve you simply float the dust or fibre, whilst the middlings fall through the silk. Besides, the pressure and velocity of the air under the silk tend to keep the meshes open. After passing through the middlings it loses its force, hence the heavy particles fall through, the lighter ones are carried into the stive-room or over the tail.

For coarser middlings a combination of both may be used with advantage, but for coarsest of all I prefer an exhaust with the assistance of centrifugal force. If you put such middlings under a magnifying-glass you will find them of all sizes and shapes. To illustrate: I want twenty men of a given weight—that is easily done; but if they have to be of the same height and width the task is not so easy. So it is with these middlings, you cannot get them through the same meshes of the silk, though they are of the same weight and value, therefore it is only by their specific gravity that we are enabled to treat them properly.

Before concluding these remarks on purifiers, let me urge upon all who contemplate putting them in to first see they have middlings to purify—not soft flour and fibre; also to see that they are thoroughly dusted through a centrifugal machine. A reel is of no use, no matter what length; they require a certain amount of force or whipping, the same as bran, but, of course, not so severe.

Another important point is to have plenty of stive room, with sufficient outlet for the air; unless particular attention is paid to these two simple points you will not reap the full benefit of the machine.

If you make a sufficient quantity of middlings, make their purification a system, the same as you do your bolting.

I have yet to find one single machine that will do the work perfectly.

For reducing middlings, rollers no doubt are the best, more especially for the coarser kinds, and those with portions of bran adhering; but for pure, clean middlings small stones properly dressed will give you a fine granular flour. The purer your middlings the coarser number of silk you can use. As regards the value of middlings I need say but little; they will speak for themselves, if you will only make them and treat them properly. I, for one, do not like to buy them too dear. I mean do not make your offals too rich (unless you propose re-treating them), nor too small for the sake of making middlings. As I have said before in this room, "Broad, clean bran, with as many middlings as possible," ought to be our motto.

I know several millers who were so elated with purified middlings that they took no heed of the bran until stock taking came round. I need hardly say they were thankful that the salutary period had come round, and only wished it had come a little sooner.

Middlings flour is much whiter and stronger than first run flour, and if made from fairly dry wheats will keep a long time—we have sent it all round the world.

In conclusion, let me urge upon every miller who has not adopted purifiers to do so at once. I would sooner think of throwing my smutters out than be without them. For why? Because I can go into the market and buy fairly clean wheats, but I cannot buy a single grain of wheat that has not this fibrous discolored matter in it.

I have often been asked, Can you get as great a yield of flour by purifying? I say, Yes, provided you work everything close up, and use rollers, more especially for the coarser kind. Why, we are getting a useful flour from stuff that used to go to the pigs, and, oddly enough, it looks better after purifying and rolling than it did before.

If the substance of this paper should prove of some use to our members, as well as those who have not yet seen their way to join us as an Association, I shall be greatly pleased. As I said before, I felt some diffidence in appearing before you with this paper, because I believe I am the first miller who has contributed an article on milling for this Association; I hope I may not be the last. I have had very little time to prepare it, so I hope you will overlook any discrepancies and accept it in the free, open manner it is given.

**MILL FOR SALE** advertisements will be inserted in the UNITED STATES MILLER hereafter for One Dollar per insertion, cash to accompany the order.

**The British Millers' Exhibition.**

Following are the regulations and conditions of the International Exhibition of milling machinery to be held at Agricultural Hall, London, May 10, 11, 12, 13 and 14, 1881.

1. A full description of articles proposed to be shown must be forwarded with each application for space.

2. The management reserve the right to refuse any article not deemed suitable.

3. The charges for space will be as follows: Up to 250 feet, 9d. per square foot; up to 500 square feet, 8d.; up to 1,000 square feet, 6d.; up to 2,000 square feet, 4d. All charges must be paid at the time of application. Applications for space to be sent not later than Saturday, January 1, 1881. Special arrangement must be made by exhibitors requiring steam or gas power.

4. The allotments of space will be made by a committee of the National Association of British and Irish Millers, immediately after the 1st day of January.

5. Each exhibitor may erect benches or other contrivances for displaying exhibits, but will be responsible for the removal of such exhibits and any fixture and fittings at the close of the exhibition, and for making good to the satisfaction of the Managing Director any damage from the action of smoke, or from any other cause and the Managing Director may at any time require the removal or alteration of any objectionable fixtures or fittings.

6. Exhibitors will be permitted to employ persons to explain their exhibits and receive orders, but will be prohibited from soliciting them to the annoyance of other exhibitors. No exhibit may be removed until after the close of the exhibition.

7. The management will not be responsible for the safety of any articles exhibited. The cost of conveying goods to and from the exhibition must be borne by the exhibitors.

8. An explanatory catalogue will be published under authority. A few pages of the catalogue will be reserved for advertisements. Terms for advertisements: Whole page, £4; half page, £2. Particulars of advertisements to be forwarded to the secretary not later than April 12, 1881.

Exhibits will be received at the hall on and after Saturday, April 23, 1881, and all preparations must be completed by 7 o'clock on Monday evening, May 9. All exhibits and fittings must be cleared by 8 o'clock P. M. on Wednesday, May 18, 1881.

Should any question arise not provided for in the foregoing conditions, the same must be referred to the managing director and the committee, whose decision shall be final.

Exhibitors' tickets and attendants' tickets will be forwarded in due course.

The exhibition will be open from 10 A. M. to 10 P. M. each day. Admission, first day, 5s.; second day, 2s. 6d.; other days, 1s.

Applications for space must be made to John H. Rafferty, managing director, Agricultural Hall, London, or to John H. Chatterton, secretary National Association of British and Irish Millers, 61 Mark Lane, London.

**Our Trade With Asia.**

The following is an extract from the report of Secretary Thompson, of the Navy Department: The Pacific ocean opens to our future commerce its broadest and most profitable field. Upon the Atlantic it encounters such formidable European rivalry as can only be overcome, if at all, by the most persistent and vigorous measures of protection on the part of the Government, but our acquisition of Alaska and the Aleutian Islands, and our treaty relations with Japan, the Sandwich Islands, and Samoa, together with our present commercial intercourse with China and the East Indies, place us upon such equal terms upon the Pacific with other powers that it will be our fault if the advantages now promised to our commerce shall be lost. An exchange of our products for those of the East is fast becoming a necessity to all the Oriental people, and their interests, as well as ours, suggest the adoption of the most efficient measures on our part to increase our trade with them. Even in Corea our manufactured articles are preferred to those of England; but they find their way there through the Japanese, with whom the Coreans have a treaty of amity and commerce.

The benefits derived in this way, however, are indirect, and would be greatly increased if the ports of that country were open to our merchant vessels. Our relations with the Japanese Government are such that there is no reason to doubt its friendly agency in bringing about this result, and it is confidently believed that it will be accomplished in a short time.

(Written for the UNITED STATES MILLER.)  
About Roller Mills.

BY W. D. GRAY, ESQ., MILWAUKEE, WIS., CONSTRUCTING ENGINEER OF MILLS AND MILLWORK.

*Editor United States Miller:*

Time and again have you requested me to write an article for your valuable paper, and as often have I promised to do so as soon as I could find the necessary leisure for the purpose. As you are well aware the past year has been an extremely busy one for me, and even now I am using hours for fulfilling my promise which I feel as if I ought to devote to needed repose.

Modern writers delight in introducing their essays with a citation from the writings of some ancient Greek or Roman, and perhaps it is as well for me to follow the fashion and quote the sage conclusion of Confucius, which in liberal English may read: "times are continually changing and so are we changing with them."

Yes, indeed times, and customs, and methods, and processes, and machines change with surprising suddenness sometimes, and no one is at present in a better situation to know this fact than the modern millwright, miller and millowner. The enterprising miller of to-day is anxious to be rather ahead of than behind the times. We are bound to move ahead with the enterprising spirit of this age,

Who would have thought 15 years ago that the grinding of grain could be accomplished more economically with something else than with stones? It was, I believe, in the year 1872 that I first heard of rolls being used for this purpose. At that time a wide-awake miller in the great Northwest (Mr. Mowbray of Winona, Minn.,) had some marble rolls constructed at the works of E. P. Allis & Co., in Milwaukee. The work, so to speak, was ordered in a whisper and executed on the sly,

FIG. 4.

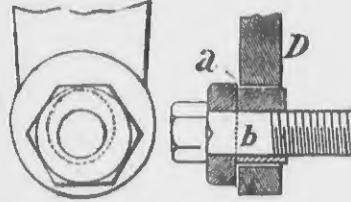


Fig. 4.—Leveling Eccentric.

and the rolls carefully boxed and marked "This side up with care," were sent up to the mill. The roll bodies were about 20 inches in diameter and 4 feet in length. Curious stories I heard about people stealing admission through the basement windows, and filling their pockets in haste with samples of bran, middlings, flour, feed, etc. Mowbray proposed to keep this thing to himself, and his double barrelled shot-gun was reported to be always loaded. Next in line were Mr. J. B. A. Kern, of Milwaukee, and Mr. John Karcher of Isenours, Minn. They also tried the marble rolls. I heard that they experimented with them eagerly to harden them by tempering, or case-hardening, as they quickly wore out and had to be frequently returned. The rolls were apparently giving good results, but marble is rather ominous. It is used generally for monumental purposes, and those marble rolls for the time being were the tourbstones of progress in that direction.

The next I heard of was the importation of chilled cast iron rollers by Ex-Gov. C. C. Washburn at Minneapolis. None but the most faithful men were picked out to unbox and put them up, and in the meantime the doors which formerly had always been open to fellow craftsmen, were shut on them. About the year 1876 I saw the first porcelain rolls. They were F. Wegmann's patent rolls. Those were of the smooth character. I saw the roller mills work, closely scrutinized the products and came home fully persuaded that the porcelain rolls were grinding cooler and with less power than the millstones; that the natural biscuit porcelain was eminently adapted to the reduction of fine purified middlings to sharp white flour; that the rolls were keeping sharp and did not need the constant trouble and careful dressing and sharpening, without which millstones will never do good work on fine middlings. I expressed my views to Messrs. E. P. Allis & Co., and they entered into a contract with the inventors and manufacturers, Messrs. F. Wegmann & Co., of Zurich, Switzerland, by which they were to be the sole agents for and sole manufacturers of the United States. I found Messrs. F. Wegmann & Co.'s agent, Mr. Oscar Oxle, to be a very highly educated gentleman and a thorough milling expert, and he explained most clearly the success of grinding with rolls in Hungary

and South Germany. As I was well persuaded of the superiority of porcelain rolls for the purposes above explained, I worked them in wherever I could, and they gave successful results. It is true I am advocating the use of porcelain rolls strongly. I do the same with anything which I believe to be a benefit to my milling friends, and I can assure you it was not very pleasant for me to hear just com-

rolls by introducing a bona-fide "American" machine, which could be run faster and producing better results. It stopped the breakage of shells, made it possible to level the rolls in a few minutes and discarded the abominable noise altogether. The United States and Great Britain granted me a patent on my roller mill of which Fig. 1 shows the driving side, Fig. 2 shows the opposite side, Fig. 3 shows the

were made with great care, they would work best while they were new, but they will soon become worn, and when there is too much play between the teeth, the friction between the roll bodies will intermittently cause the slow roll to run ahead, following the surface of the fast roll, thus its teeth will knock against the backs of the other (?) gear and still increase the trouble of jarring the rolls.

Consequently I applied BELTS, thereby doing away with the noise, increasing the capacity of the machine and improving the grinding.

It is early to convince millers that for good grinding on a mill-stone that the belt is the best. If it is good on mill-stones, it must also be good on the rolls.

I read recently in Appleton's Encyclopaedia, page 369, that in most European mints the gears on the coining rolls have been discarded and each roll is now driven by an independent belt, thus insuring a gold or silver sheet of a far greater accuracy than heretofore accomplished by the geared rolls. If it will do this in rolling gold, will it not do the same in making flour? I think it is evident enough that it will.

The mode of fastening the porcelain shell to the shaft was to key on shaft a ribbed cast core half an inch smaller than the inner diameter of the shell, then fastening the latter to the cast core by pouring melted sulphur in between the roller shell and core. Now when boxes got hot and the shaft with the cast core expanded, the sulphur and porcelain did not expand and burst.

Another source of breakage was the loosening of the shell, the sulphur becoming broken by the constant jarring and trembling caused by each individual tooth of the gears. Mr. Wegmann did away with this mode and fastened the roll merely by friction, allowing the air to circulate between the shaft and shell. Two faced-off flanges are keyed on the shaft, and the porcelain shell is put between them

FIG. 12.

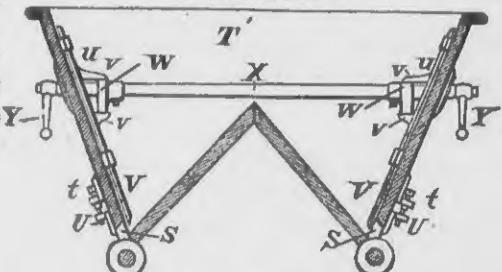


Fig. 5.—Hopper Inside Gates.

and by means of three strong bolts the flanges are pulled together on the shell as much as the bolts will stand. Users of belted porcelain rolls with shell fastened by the new mode are to be congratulated on the fact that breakages of the porcelains are now comparatively rare. In the winter of 1878-79 I visited Europe to study the subject of foreign milling. I found porcelain rolls used very extensively, but there were also many smooth chilled iron rolls, perhaps more than porcelains, in use. I examined the grindings and sought to discover if the same result could be obtained from the chilled iron rolls as from the porcelain rolls so eminently fit for the desired purpose.

The rolls did not work well at all. The flour felt greasy, was rather warm and very flaky. It had to be disintegrated by extra machines or these flakes would have all passed over the silks no matter how coarse. The iron rolls grinding middlings to flour had to be set together very powerfully to accomplish grinding. The great amount of power lost in bearing friction, an intelligent miller will readily comprehend. Porcelain rolls need no disintegrators. The meal from them is cool, sharp and white. I saw a great many rolls of different construction, but never found roller mills in which each roll was driven by belt. When I informed the experts of the success of my belted roller mills in America, they thought the holding back of the slow roll was not positive enough!

I told them if the belt was of sufficient width and tightness, it would not slip, no matter how tightly the rolls were screwed together. By examining the above cuts, you will find that I locate a counter-shaft through the centre of the machine stand. It is hung in universal bearings and can be screwed down at any time, even when the roll is at work. It is a reverser of motion and tighter simultaneously. The roll boxes were of brass and were in two parts, bottom and caps. Being divided horizontally, the pressure was just on the dividing line. I parted the bearings at 45 degrees, receiving the pressure by bottom of box. I am of the opinion that a box babbitt by No. 1 Babbitt metal, will work cooler than a brass box, therefore I employ Babbitt boxes on my rolls exclusively. The Chief Engineer of Messrs. E. P. Allis & Co., Mr. Edwin Reynolds, a gentleman of

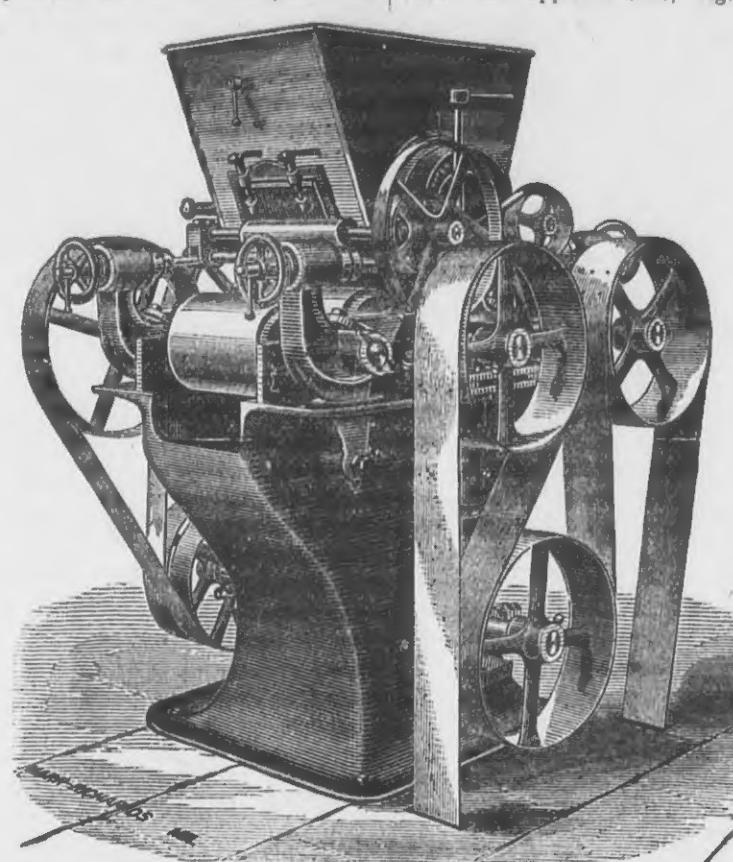


Fig. 1.—Driving Side.

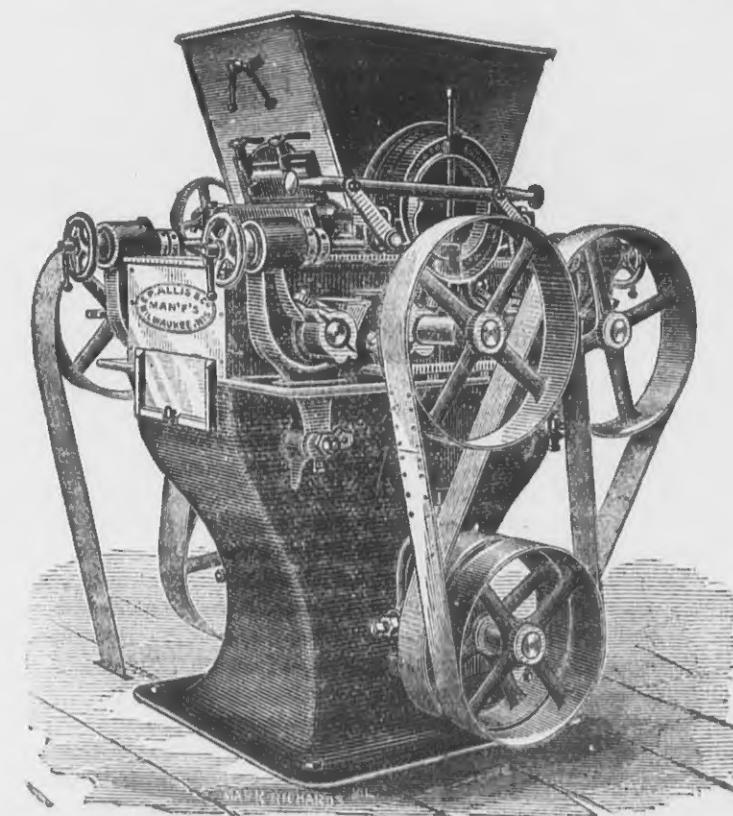


Fig. 2.—Roller Mill, Rear View.

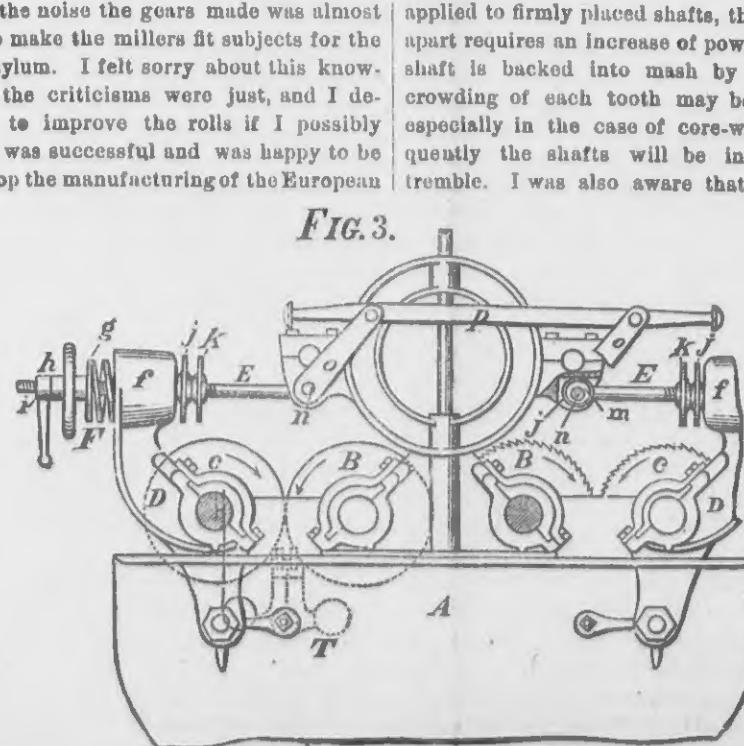


Fig. 3.—FIG. 3.

great practical experience, babbits the main pillow-blocks of his famous Reynolds-Corliss engines, and is at any time ready to prove the superiority of good babbitt bearings over brass bearings. To keep the rolls in place, laterally, I have collars turned on the roll-bearings in centre of journal, so that the collar is always running in oil and no oil is thrown off as would be the case if the shafts were shouldered on the inside face of the bearings. It has been my aim to construct a self-oiling box for the roller-machines. I have tried many devices, and about six months ago applied wick-boxes to all bearings with very good results. The wicks stand upright in oil-chambers below the journals, and touch the same. None but pure oil will rise in thewickings to the shaft owing to capillary attraction. The boxes are stopped on ends, where no shafts penetrate, and are thus all well protected against filling up with flour dust. The oil-chambers can be easily cleaned by scraping them out with a wire after having removed an oil-tight plug on the end of the box.

If two true rolls are touching they will only bear all along their bodies, when the axis of the one is perfectly parallel to the axis of the other.

The touching line is as fine as the edge of a knife, and unless the rolls are parallel, these knife-edges will cross at one point and grinding will be effected at the crossing point to such an extent as to kill the middlings, while on both sides of this point the rolls are open. The miller will screw the rolls together very tight in order to get a better result, and the consequence will be heating in the bearings, increase in power required, and the product will be left as imperfect as before.

I saw the great necessity of arranging the rolls in my machine so that at any time one roll of each pair could be raised on each of its ends. Fig. 4 represents the simple device accomplishing this. The inside rolls are stationary and the outside rolls are movable, swinging on an eccentric nut which is held in position by a tap-screw. By loosening the tap-screw a trifle the eccentric sleeve-nut can be turned, and thereby that end of the roll above the eccentric nut can be raised or lowered. With each roll the manufacturers furnish a planed leveling-plate. If this is placed on the roll bodies and it can be "rocked," it will show that the rolls are not parallel. Now use the eccentric nut and adjust the roll until the leveling plate will stay firm, and the rolls will be perfectly parallel.

This resetting is necessary as the boxes will never wear off evenly.

A glance at the cuts of the machine will show you that I have abandoned the old idea of setting the rolls together with weighted levers. This is a relic of former times and was used in the first roller mills built in Europe. Weights do not work quickly enough. They act too lazily or, as the learned men would say, the inertia of the weights is a cumbersome thing to contend with on sudden changes of the streams of the feed. Many who have their rolls held together by weighted levers prefer to do away with them and set their rolls together rigidly. I applied spiral springs guarded in sleeves. They are located as far above the center of the roll as the latter are above the eccentric sleeve nut so that but half the pressure is needed to press the rolls together that would be required if the tightening screw and spring was right back of the shaft. In this way I employ a small spring and the setting up of rolls does not require great exertions.

I am giving the patient reader the full description of the course of improvements I had to make to render my rolls fit to do their work well, and I will mention that I was greatly troubled by millers using more than one of my roller mills complaining that when the mill was shut down for oiling, etc., some of the stuff in the hopper would trickle through between the gate of feed rolls and on re-starting the belts could not master the accumulated stuff between the rolls and slipped off. In order to guard against this emergency the miller had to release the springs and destroy their careful setting. This was very annoying as the rolls would have otherwise worked well for a long time after they were once carefully set.

The manner in which I overcame this trouble is shown in cuts Fig. 8 and Fig. 5. The pull-rods passing through the springs and movable boxes have threads on one end and the hand wheels thereon by means of which the rolls are set together. I fastened these on shafts with eccentrics which shafts are placed parallel to the rolls in the machine. In

my four roll machines I used two of those shafts both of which are provided with cranks on ends, which cranks are connected by parallel rods with knobbed ends. The miller can reach one of these knobs from whichever side of the machine he may stand and throw the loose rolls apart enough to allow the leakings of the hopper to pass through without accumulation. He does not need to touch the hand-wheel back of the spring, nor the gauge nuts, setting the rolls apart any distance required. On throwing the rolls together again they will work precisely the same as before. Subsequently I put on gates on the inside of the hopper, moved by eccentrics on one shaft, penetrating the hopper perpendicularly to the axis of rolls. This shaft projects out of the hopper on both sides, and it being provided with a small lever on each end it may be turned from both sides of the machines. All millers know that it takes some time in starting up a mill to get the feed of the different machines just right, which is done by the inside gates in my machines. When the adjustment is once effected it will remain good for weeks. If the machines did not have the outside gates above described the outside gates

during the breaking process, as it cannot be purified and will necessarily be mixed, more or less, with bran particles and dust having adhered to the wheat berry.

Fig. 1 showing the dress I use on my rolls gives, according to my experience, the best results. Run as I direct. Roll A is the fast roll and runs at least from two to three times as fast as roll B. The wheat, if well graded, will be split open lengthwise, almost every berry. Only a small quantity of flour is made in the first break, which flour is chiefly the dust lodging in the crease of the kernels, and therefore only fit to go into low grade flour. By the splitting of the berries I get rid of the greater portion of the germ. If you reduce the ratio of speed of the rolls you change the conditions and you will make more flour owing to the increase of the squeezing action. If you run the rolls at an even speed the conditions are entirely changed, as there will then be only a squeezing action. Again, if we make B the fast roll and A the slow one, the conditions are entirely changed, as the work is then done on the back of one tooth passing the back of the other producing a rubbing or bruising action which, of course,

can be obtained by rolls corrugated as per Fig. 1, with roll A as fastest, and running about two to three times as fast as roll B, in reducing the wheat, in cleaning the bran, making the least flour and the most middlings.

Some roll makers tell the millers that rolls corrugated as shown in Figs. 4 and 9 with round, fluted or wave-like corrugations are the best to buy, as only few rolls and purifiers are required, and a vast percentage of the "patent" flour was obtained, I think 90 per cent. A great many small mills are talked into this. Very well, but my idea is thus: Some of the objections to the dull rolls are, they make too much soft flour, too many fine middlings that are hard to purify, which middlings will on regrinding produce a flour which cannot pass for a fancy flour, but must rank with Bakers, and if half the mills of this country should put in the dull rolls and make 90 per cent of "patent" flour, or to call it by right name Bakers' flour, this class of flour would be a "drug" in the market. The dull rolls also require a great deal more power than the sharp rolls, as it has been experimented upon and found that it takes twice the power to squeeze wheat than it takes to cut it. The

dull corrugations, already used in Europe years ago, were revived during these last few months, and millers have been appealed to adopt them. A new discovery! There are millions in it! has been the cry. I think the same, but it is in letting it alone. They say, the sharp rolls break the germ. This is so, any corrugated roll will break the germ in hard, dry wheat, but not more than the dull rolls, besides the percentage of broken germ, caused by sharp rolls, is very small.

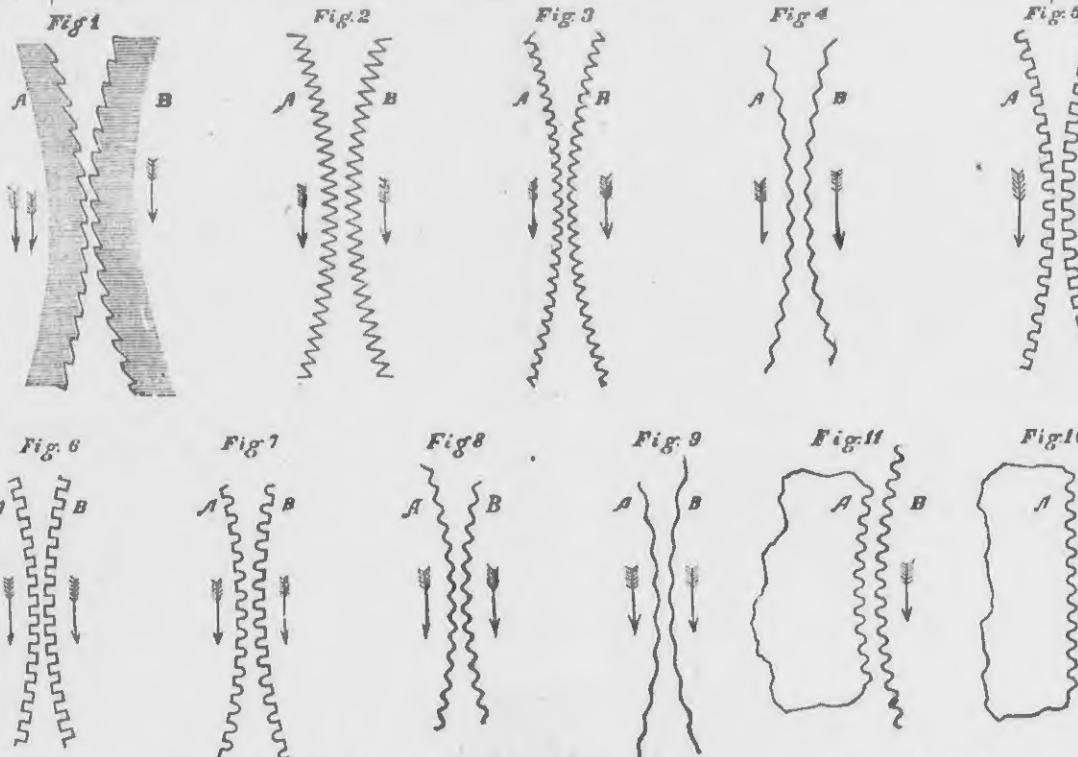
Some say, for the first reduction the dull rolls are best adapted. If it will do for any reduction at all, it will not do for this one, as the first reduction wants to be made without any bruising, so as make as little flour as possible, for what is made must go to Low grade, as it is largely the black dust in the crease of the berry. The advocates of dull rolls assert: there is no dirt in the crease of wheat if it is well brushed; that it is the sharp rollers which make it. This, I think, is a mistake. If you will take the trouble to sit down with a sharp knife and split one peck of wheat, grain by grain, sift the spoils, you will get dirty or low grade flour. The advocates of dull rolls say this is a part of the 90 per cent of Patent. Or if you will pass your wheat through smooth rolls running at even speed and bolt it, you will have low grade flour hardly fit for red-dog. All Minneapolis millers know that, as they have done this for years, but the dull roller men still say—this is a part of their 90 per cent of Patent. Well, it may do for their Patent flour, but it will not bring a patent price.

Will dull rolls do for the last two reductions? I say that bran cannot be cleaned on dull rolls. For the past year they have been put in many mills for such purposes, but Messrs. E. P. Allis & Co. have displaced them all by sharp rolls, and the men that have gone so far as to advise the use of those dull rolls for the last reduction have just found out that fact, and are putting sharp rolls in for their last two or three reductions. I presume, that, after they have learned a little more about gradual reduction with rollers, they will put in sharp rolls for the three breaks remaining.

I would say to my milling friends before closing, that they had better buy rolls as soon as they can, for rolls of any kind or description are better than stones for the reduction of wheat and cleaning of bran.

I have tried to fill my premise in as plain and simple a manner as possible, not claiming to be a writer on milling subjects, but a mill builder. I remain, yours truly,

W. D. GRAY.



Cut, Showing the Different Styles of Corrugations for Rollers, prepared expressly for the U. S. MILLER.

would have to be disturbed and shut every time the mill was stopped to oil up, etc.

During my journey in Europe I saw roller mills having rolls with corrugated or creased surface. I had heard about these rolls before I crossed the water, and was rather interested in seeing their work and the shapes of the corrugations. I will say here that I made many sketches of roller mills and corrugations to take along, for if you have a thing in black and white you will frequently find it a great comfort. The cuts shown in the accompanying illustrations are made from some of these sketches. The reader will see that all possible shapes are in use by our European milling friends.

Some of these corrugations run parallel to the roll axis, some on a flat, some on a steep screw line, both rolls being provided with a right hand or left hand thread, or both with different threads. I found that the most rolls were corrugated on screw line, both rolls having either a right or left hand thread so that the corrugations cross each other at the point of contact effecting a shearing of the particles to be cut or reduced in size. As to the shape of the grooves I can report that the most of the rolls were corrugated in the saw-tooth fashion, similar to the one I put on my rolls.

I represent the shape of my corrugations in Fig. 1 in the plate showing different styles of corrugations. Fig. 2 represents the dress of the Sulzer rolls used thirty years ago. Messrs. Escher, Wyss & Co., roller mill builders, used this dress exclusively, but they have changed and have adopted altogether the saw-tooth like dress. Fig. 3 is an out-of-date corrugation, seldom used. Its form is like fig. 2 with its points turned off. Fig. 4 is a very shallow corrugation, the space between points is greater than the depth. Figs. 5, 6 and 7 represent corrugations I have only seen used on very old rolls. Fig. 8 shows deep round grooves. Fig. 9 represents a similar corrugation, but very shallow and wave like. Figs. 10 and 11 are of the same shape as 7 and 8 respectively, but in Fig. 10, B is the roll and A is a stationary straight shoe. In Fig. 11, B is the roll and A is a concave shoe.

The aim of all our experienced modern millers of the present day is to reduce the wheat on corrugated rolls to middlings, which are purifiable, and to make as little flour as possible

will again make more flour in the reduction, which it is desired to avoid in the system of breaking wheat on corrugated rolls. It will make so much flour that you cannot afford to put the first and last reduction into low grade but it must go to Bakers. This of course makes your Bakers flour darker and softer. If B is the fast roll, the pair of rolls must run about twice as fast to get capacity, and this, of course, means loss of power.

I claim that the rolls corrugated as shown in Fig. 1, are capable of doing any kind of work that can be done with the sharp or dull rolls. All depends upon what the operator desires to do, if he understand the principle of roller action. For a high percentage of middlings he may run the roll A fastest; for low grinding, more flour and fewer middlings, he may run B fastest.

The best mills in Hungary, where the best milling in the world is done, after having tried all other shapes, are now using rolls corrugated similarly to those shown in Fig. 1. The best mills in this country also are using this corrugation, being persuaded of its superiority.

The corrugations shown in Figs. 2, 3, 5 and 6, are very apt to clog between the teeth, nevertheless, they produce a good many middlings, owing to the sharpness of the teeth. These corrugations are carefully re-sharpened after having become dull, as they make too much flour in that state or condition. The corrugation shown in Figs. 7, 8, 10 and 11 are rounded corrugations which will give trouble, on account of their filling up soon, and will do their best work on hard wheat. Messrs. E. P. Allis & Co. were, according to my knowledge, the first mill furnishers that tried to introduce the combination of roll and concave shoe, shown in fig. 11, in this country, several years ago. They put some machines like this into Mr. J. B. A. Kern's mill, in this city, and afterwards into Gov. C. C. Washburn's mill at Minneapolis, Minn. These machines were taken out long ago and replaced by my four-roller machines, corrugated as shown in fig. 1. Two rolls working together have been found by experience to give far better results than rolls and shoes, as the latter make too much flour, and the shoes wear off very fast.

No one pair of rolls, corrugated as shown in figs. 2 to 11, can give the same results that

**ANOTHER ST. LOUIS MILL BURNED.**—The Pacific Mills, of St. Louis, owned and operated by Kehlor Bros., caught fire between 4 and 5 o'clock on the afternoon of Dec. 23d, and were completely destroyed. Loss is estimated at \$100,000. This mill produced 152,141 barrels of flour during the year 1879. About 500 barrels of flour, 10,000 bushels of wheat and \$15,000 worth of new machinery not yet set up, were also destroyed. Henry Carroll and Patrick Larkin, members of Fire Engine Co. No. 18, were carried down by falling floors in the elevator on the north side of the mill. Carroll was killed and Larkin injured. Insurance \$46,000. The fire was caused by one of the stones running empty.

**Hot Journals.**

One of the most important cares of an engineer is to see to it that the various bearings of the machinery in his charge are smooth, of uniform surface, and rightly adjusted. This apparently simple duty frequently requires the exercise of his best judgment; it is not only necessary that the journal box surfaces be close to the journal, but it is frequently just as necessary that the journal boxes be prevented from accidentally approaching closer to the journal. In a steam engine under full head of steam the play of one sixty-fourth part of an inch between the crank pin boxes and the crank pin may be sufficient to jar the whole engine; and yet, if the engineer, in endeavoring to take up this lost motion, should accidentally overtighten the crank pin boxes, the chances are that a broken crank pin or pitman, and a knocked out cylinder head, will serve as an illustration of the union which is apt to take place between the crank pin and its boxes under such circumstances. Many an apparently unaccountable break in a revolving shaft has occurred from a defective bearing. Heavy shafting, carefully lined in hangers secured to the workshop ceiling, may for months run without any sign of heating; but a pile of iron castings, or other heavy weight, unequally disposed on the floor overhead, may cause just sufficient deflection to expose the revolving shaft to one of the most destructive strains, and cause one or more of the hanger bearings to heat. In machinery, the wearing away of one of the parts may subject another part to destructive strain, and it generally requires the exercise of experience and judgment in the construction and handling of the machinery, in order to prevent the harm. Many tons of coal have been wasted and much wear and tear of bolts and machinery caused by inattention to these defects. In steam engines especially the adjustment of the journal boxes requires close attention. The expansion of the journal by heat, the quality of the lubricant used, the condition of the bearing surfaces and the amount of pressure they will be subjected to, exclusive of dust, speed of revolution, etc., should be taken into account. In all metal there is more or less elasticity, and when one box of a journal is by means of its screw bolts drawn to the right position in regard to its journal, it should also bear solidly on the other box, in order to maintain the adjustment of the boxes to the journal; if this precaution is neglected, when the shaft is revolving the elasticity of the screw bolts appears to act to cause an approach of the boxes, thereby squeezing out the oil from between the bearing surfaces and causing them to heat or grind. It appears that the continuous motion in one direction of one metal in close contact with another, tends to produce a still closer contact and finally a union of the metal surfaces; the lubricating oil, by preventing direct contact of the metal surfaces, opposes this tendency, and the use of liners or equivalent means to prevent the improper approach of the journal boxes, aids the oil in insinuating itself between the bearing surfaces. It is surprising to watch the effect of a few minutes' grinding of a journal in its bearing. We have seen a twenty-horse engine, under full pressure of steam, brought almost to a standstill by the sudden grinding of one of the bearings of a shaft about two inches in diameter. It appeared that the shaft would have twisted off sooner than revolve in the defective bearing.—*Scientific American.*

**Mechanics as Writers.**

There is no department of productive business in which a larger proportion of actual brain-work is employed than in the building and working of machinery, and there is no class of our producers who offer so little of their experimental knowledge and observant wisdom to the world in printed form. The agricultural papers teem with communications which frequently contain valuable hints, exact information and suggestive facts. But the publications devoted to mechanical matters and the interest of workers have far less of these voluntary contributions. One of the reasons for this is, undoubtedly, that practical mechanics may be properly considered one of the easiest sciences, and statements that in departments of industry would pass for mere personal opinion, become of great importance as elucidations of mechanical law or demonstration of fact, which are too often deemed by the experimentors as mere tests, lacking the authority of practical use. Yet, in many cases, these tests are more than experiments, and frequently carry with them their own demonstration. The mechanic deals with material substances and mechanical processes that are continually presenting new problems for solu-

tion, and are capable of being solved by more than one method. At least, this solution invites attempts in more than one direction. So the mechanic dislikes to provoke criticism and invite comparison when he knows the field is so large and the cultivators so many. There may be another reason why the mechanic does not "rush into print" so readily as some others. He is not given to talk. His work requires, largely, concentration of attention that leaves little time for talk. Indeed, the mechanic generally prefers to illustrate by sketch or work rather than to elucidate by words. In fact, this method is easier than talking. It is not easy to convey a proper idea of a machine and its operation by words alone. The choice of language and the avoidance of mere "shop talk," necessary to convey to the general reader mechanical ideas, demands a very thorough knowledge of the English language and some acquaintance with cognate tongues. It is not meant that the writing mechanic must necessarily be a college graduate, or even to have borne off the honors in a high-school class. But choice of language in mechanical writing is a necessity—not a mere convenience. The writer on mechanical subjects ought to know that "rotary" and "revolving" are not synonyms, and that "force" is not necessarily "power;" these and similar errors being quite common. There may be other reasons why mechanics are not fond of writing for publication. But it is a fact that the number of really practical workers who are writers on their specialty is very small indeed. The number of practical mechanics who are regularly employed on mechanical papers in this country is so insignificant when compared with the value of our mechanical interests, as to surprise one who takes the trouble to inquire. There can be no doubt that the welfare of working mechanics would be greatly enhanced by a greater willingness on their part to present the results of their own experience to their fellows through the medium of the special papers devoted to their interests.—*Industrial Monthly.*

**Why Southern Manufactures Develop Slowly.**

A great many people complain that all sorts of finished articles for use on farms, in households, and workshops, are not made in the South where wood and iron are so cheap. There may be some ground for this sort of grumbling, but not much. The American people go in any direction in which they get their heads set fast enough—a good deal faster than any other people go, or ever did go.

Cheap raw material is only one consideration entering into the problem of successful manufacturing. Wood in the crudest form is more plentiful and cheaper in the primeval forests of the great Northwest than anywhere else in the world. But there are no manufactories there of lumber, sash, doors, blinds, shingles, laths, tubs, pails, or of any one of the thousand and one articles of lumber and finished wares made from it. The logs are rafted to the towns and cities, there first made into rough boards and square timber; and thence most of this is taken to the great marts of trade, where capital and skill are concentrated, and converted into finished works of art and use. Chicago is many miles from any great supply of pine, but it is there the whole South buys millions of dollars' worth, yearly, of pine doors, sash, shingles, and the like. There are the great factories of woodenware of all kinds.

Two or three conditions must be combined to secure the building up of factories producing the finer and higher articles produced from iron and steel: 1. The crude metals must be abundant, cheap, and of the higher grades. 2. There must be accumulations of capital or its immigration must be secured. 3. The courage to take hold, as pioneers, must abide with those who have the capital.

The South has not yet developed a good steel iron. That is to say, we have not produced in any quantity worth mentioning irons that can be relied on for the making of first rate open-hearth, Bessemer, or crucible steels. Soon enough our furnace-men will reach these higher grades of products; and when they do the money and skill will probably be here to make them available.

One thing at a time! The Southern iron district has been developed with a rapidity unprecedented in the history of iron-making. "First the blade, then the ear, then the ripe corn in the ear." Our excellent coke and charcoal irons are the "blade" of the iron furnaces. The higher arts in iron articles will arrive all in time, when we shall reap the "ripe corn." For the present, let our people be thankful that the fodder made from the "blade" and the crude "blades" adds \$10,000,000 annually to Southern commerce and industries.—*Chattanooga Tradesman.*

**Crossing Wheat.**

The sexual construction of the wheat plant and its habit of reproduction are remarkably interesting. It is commonly supposed that two varieties of wheat sown near together will mix. This opinion is not true, for wheats cannot mix in this way; and yet cases have occurred in which it has appeared that they had done so. For instance, a white wheat is planted near a field or a plot in which red wheat is sown. The facility with which wheat changes its appearance will often, and has sometimes made the red wheat lighter and the white wheat darker, and this has led to the supposition that the two had mixed. But the habit of growth of the wheat plant prevents such an occurrence, for the fertilization takes place before the glumes or chaff open to permit the anther, which bears the pollen, to extrude itself. Besides, the anther sheds its pollen before it emerges wholly from the glume, and the pollen falls directly downward upon the pistil at the bottom of the glume, and thus fertilizes the ovule or embryo seed. Every glume on the ear is closed very tightly at this time, and the pistil within cannot be reached without forcing open the glume or chaff. Thus every single grain is self-fertilized, and the variety cannot be changed by impregnation from an outside source without artificial help. This help is given in the operation of crossing or by artificial breeding, often called hybridizing, but wrongly so, because a hybrid is a cross between species and not varieties. For instance, a cross between sheep is a cross, and that between a sheep and a goat would be a hybrid; so a cross between one variety of wheat and another is precisely similar to the crossing the Ayrshire and Jersey breed of cattle together, and cannot be truly called hybridizing.

The operation of crossing is a delicate one, and requires very great care and nicety. It is as follows: Before the anthers have emerged from the glume this is opened and the three anthers contained in it are cut off with fine scissors and removed. After this is done, pollen from anthers of the variety chosen to cross with are applied to the pistil which has been deprived of its accompanying anthers. The pollen grains falling on to the pistil, which is much like a feather in form, adheres to its glutinous surface, and are absorbed into the ducts which carry them to the ovule, with which they immediately coalesce and become united. The ovule then begins to swell and grow until the seed forms and becomes mature. In this way several experimenters are diligently occupied in producing new varieties, which they are able to do with as much certainty of reaching desired results as the breeder who crosses his cattle, sheep, or pigs. The laws which govern the reproduction of animals are the same for all practical purposes as those which control the reproduction of plants, and the effects of crossing varieties are as marked in the one case as in the other. Some of our best varieties of wheat are crosses, and there are hopes that very great improvements in the character of wheats as regards hardness, prolificness, and freedom from depredations of insect pests, may be made from time to time.

**PARAFFINE AS A PROTECTION TO WOOD AND IRON.**—A German scientist recommends paraffine as an efficient means of protecting wood against damp, acids and alkalies. The wood is first well dried, and then covered with a solution of one part melted paraffine in six parts petroleum, ether or bisulphide of carbon. The solvents evaporated quickly, leaving the paraffine in the pores of the wood. Great care must be taken in the use of this preparation, as paraffine, as well as petroleum, ether or bisulphide of carbon, is especially inflammable; and even the vapor of the two last mentioned substances, if mixed with air, may give rise to dangerous explosions. Paraffine melted, with equal parts of linseed oil and rapeseed oil, is also very useful to protect iron from rust.

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## Historical Sketches of the Corn Trade.

From the *Corn Trade Journal*.

The earliest record we have of the corn trade in Biblical history, if we accept the journey of Joseph's brethren to purchase corn in Egypt, is in the twenty-seventh chapter of Ezekiel, where we are told that the merchants of Judah and the land of Israel traded with Tyre in wheat of Minnith and Pannag, two cities of Palestine noted for the peculiar excellence of their grain. The merchants that purchased Joseph were probably itinerant traders attached to a caravan en route from India to a port on the Red Sea or the Mediterranean, or possibly the Nile, in the neighborhood of which river it is highly probable the city of the Pharaohs was situated. In ancient times the difficulties of transport limited the dealings of merchants to spices, aromatic gums, fine cloths and other light and marketable commodities, unless the peculiar excellence of the article, like the wheat of Minnith and Pannag, commanded a high price and a ready sale in the opulent commercial cities of Tyre, Tarsus and Sidon, or in the luxurious courts of Persia, Greece and Rome. The Israelites were not a commercial people, but eminently agricultural, as were also the Egyptians. The little trade that was carried on was conducted by the Arabs (the Ishmaelites and Midianites), whose geographical position enabled them to monopolize the carrying trade between India and Europe. The inhabitants of Arabia maintained this monopoly almost exclusively until the discovery of the passage to India by way of the Cape of Good Hope in the fifteenth century revolutionized the commerce of the world and opened a direct route to India to the maritime nations of Western Europe. The Suez Canal has, in the present generation, dealt yet another blow to the caravan trade of Arabians, and if an overland railway to India be ever constructed, this ancient, but decayed, race of merchants will find in European capital and enterprise rivals that will soon deprive them of the remnant of their carrying trade and probably supplant them in their inland commerce.

Among an agricultural people like the Israelites, where every man not only grew his own corn but was his own miller and baker, a corn merchant's field for operations was about as limited as a hawker of warming pans in the tropics, or a vendor of ice creams at the North Pole. Even at the present day the population in many parts of the East is too thin and scattered to afford remunerative employment for a professional miller, and a hand-mill, as in the days of the Israelites, is a necessary adjunct to the domestic arrangements of every household. In the time of Moses every house possessed its mill, which consisted of two circular stones about two feet in diameter and half a foot thick. The upper surface of the lower "nether" stone was slightly sloped from the centre to the edge, and the under part of the upper or "rider" was hollowed to fit evenly upon the "nether." The mill was fed by the hand through a hole in centre of the "rider," while a small hole about two inches from the edge admitted an upright stick that served as a handle. The amateur millers, commonly the two lowest maid servants of the household, sat with the mill between them, and alternately seizing the handle impelled it round, one accomplishing half the revolution the other completing it; while the meal, gravitating to the edge, fell into a trough placed to catch it, or more commonly upon the floor. Reference is made to the manner of grinding in the Gospel of St. Matthew (xxiv., 41)—"Two women shall be grinding at the mill, the one shall be taken and the other left." The importance of the domestic mill in the time of the Hebrews is signally indicated in Deuteronomy (xxix., 6), where the pledging of a millstone is made unlawful, "No man shall take the nether or the upper millstone to pledge, for he taketh a man's life to pledge."

Solomon, in his contract with Hiram, King of Tyre, for workmen to build the Temple, agrees to supply 20,000 measures of beaten wheat and 20,000 measures of barley. This would show that the mortar, which superseded the mill, was still in use, probably to bruise the corn for the inferior class of laborers. When the Israelites had thoroughly established themselves in Palestine, and built them selves towns and cities, bakers appear to have sprung up among them. We read in Jeremiah, xxvii., 21—"Then Zedekiah, the king, commanded that they should commit Jeremiah into the court of the prison, and that they should give him daily a piece of bread out of the bakers' street." The fact that each household of the Israelites, when they hurriedly left Egypt, were forced to bring away their

bread unleavened, testifies to the absence of bakers among them. The king's baker, whose dream Joseph interpreted, was an important officer of the court, but, like the king's butler, confined his attention entirely to the royal oven, and preparing not only bread but baked meats for Pharaoh's table. Barley bread was mostly eaten by the common people, and frequent mention is made of barley loaves in both the Old and New Testaments. Flour, or rather wheaten meal, was reserved for the more well-to-do section of the community, and the methods pursued by the Hebrews in preparing their bread three thousand years ago is still followed by many of the pastoral tribes of Western Asia.

The lawgivers of ancient Greece and Rome regarded the food supply of the people as so vital to the welfare of the State, that public granaries were established and officers appointed especially to make provision against dearth and famine. In famine these fathers of wisdom recognized the mother of sedition and revolt. They knew the evils that follow in its train, and sought to secure the State against tumult and civil commotion by shutting the gates of their cities against its insidious influences. In France, a century ago, the immediate and calamitous effect of famine was signally illustrated when the shouts of the Parisian populace crying for bread culminated in the bloodiest revolution that ever blotted the page of history, and in a series of wars that desolated half Europe. A rotten Government and a dissolute aristocracy were tolerated in that country so long as the necessities of life were within the reach of the masses, but when famine stalked the land and starvation galled the industrious and down-trodden people to action, nothing could save the State from destruction or stem the torrent of fury that burst from the famine-stricken populace. To provide against famine, the Romans were accustomed to despatch a fleet of ships every year to collect corn from their tributary States. This proceeding was politically prudent, but undoubtedly a serious commercial blunder, for had the State left the food supply of the nation to private enterprise a wider field would have been opened for commerce and an impetus given to trade that might have made Rome a granary, not only for its own populace but for the nations of Western Europe.

Britain, in the time of the Romans, was the chief granary of the imperial legions posted in Germany and Gaul. When the Roman colonies of the Upper Rhine were ravaged by the barbarians in the time of the Emperor Julian, a fleet of 800 vessels was built to bring corn from Britain. England herself was at one time a frequent prey to famine, and that too in its most terrible form. Stow tells us that the extremities of famine have driven the people of England to eat horses, dogs, cats, and the bark of trees, and, what is most horrible to imagine, even to feed upon their own children. It is recorded that during a terrible famine in the year 1316 criminals upon being cast into prison were torn into pieces and devoured by the hunger-maddened wretches that lay famishing in the loathsome dens that constituted the prisons of the period. Incredible as these facts may read they are nevertheless confirmed by Maitland and other historians. In those times when the people lived from hand to mouth, and dearth or plenty depended from year to year on the state of the harvest, the fluctuations in the price of corn were of the most violent character. During the twelfth and thirteenth centuries it fluctuated from about £1. to £20 per quarter.

The price of wheat during a famine in the reign of Edward I. was nearly £20 per quarter; yet it is recorded that it was sold during the same reign at sixteen pence. Such extraordinary fluctuations are no longer possible.

The rapid transmission of intelligence and facilities of transport, whereby transactions of the greatest magnitude are nowadays conducted with promptitude and dispatch, preclude sudden and extreme fluctuations, excepting when the natural course of trade is politically affected and the machinery of commerce thrown out of gear by war or other extraneous circumstances. A dearth in any country within the pale of civilization is now no sooner apparent than the fact is flashed by electricity to every great centre of the trade throughout the world, and the intelligence is the signal for a fleet of grain-laden vessels to hasten to the famine-threatened shore; while over-speculation on the part of importers not unfrequently reduces prices considerably below average quotations. An instance of this occurred during the recent failures in our own

crops when, owing to the extensive operations of importers, prices were lower than when our fields have been teeming with plenty.

Ireland at one time appears to have supplied England with considerable quantities of corn. Edward II. when he invaded Scotland in 1322 drew a large portion of his supplies from that island. By-the-by, so late as the time of William the Conqueror English slaves were regularly exported to Ireland. Bristol seems to have been the chief seat of the British slave trade, and Wulfstan, Bishop of Worcester, the Wilberforce of the period, preached a crusade against its practice. That English men, women, and children should have been sold as slaves to the Irish is a circumstance in the history of the two countries that their present relative positions render perfectly incredible. The observation made by Gregory when he saw the English children exposed for sale in the streets of Rome "Non angli sunt anglisci;" a remark stigmatized by A'Beckett in Leech's Comic History of England, as an atrocious pun, indicates the existence of the slave trade in the time of the Romans, and William of Malmesbury refers to the odious custom as having had such a hold upon the people that they did not scruple to sell their nearest relatives and even their own children into slavery.

**A NEW CEREAL AND FORAGE PLANT.**—A new forage plant is announced from Central Asia, under the name of "Deschugara." It is said to be largely cultivated in Turkestan, as well as in Poland, where it has given most satisfactory results. From 100 pounds of seed sown 2,800 pounds of grain have been harvested, and a large quantity of straw, which is consumed with avidity by cattle and sheep. The plant has a tall-growing stout stem, which forms a green cattle food. A variety of the plant ripens three months after being sown. In the climate of Odessa it is described as arriving at maturity as soon as it does in its own country. The chemical composition of the plant approaches very nearly to that of the oat and barley, so that it is extremely useful as a cattle food. The seeds, however reduced to powder are used as ordinary flour. Some mystery attended the botanical identification of this plant, when its properties were first made known in the pages of a Continental journal a few weeks since. Mr. Christy has, however, succeeded in obtaining some seed from Russia, which together with information he has also obtained, prove the plant to be that of *Sorghum cernuum*, a grass closely allied to the well-known Dhurra of India.—*Journal Society of Arts*.

## Asbestos.

The *Journal of Chemistry* says of this curious mineral: "Asbestos is one of the most curious and interesting minerals; or, we might rather say, classes of minerals, the name being applied to quite a number of varieties of amphibole, actinolite, etc., which are themselves varieties of amphibole or hornblende, as it is more commonly called. Chemically viewed, these are compounds of silica, magnesia, lime and oxide of iron. They differ from other varieties of hornblende chiefly in containing little or no alumina, and are remarkable for assuming a fibrous character, the fibres being sometimes very long, fine and flexible, and having much the appearance of flax. They form compact masses, but can often be easily separated by the fingers. They vary in color from white to green and light brown. The name asbestos is from the Greek, and means incombustible. It is nothing strange that a mineral should be incombustible, but that delicate threads, looking like flax, should not be destroyed by fire, but should come forth from the ordeal only the whiter, like ordinary thread when washed in water, naturally seemed a remarkable phenomenon to the ancients who gave them the name.

The finest variety is called amianthus, which, in the Greek, means unpolluted; all the stains that it receives being removed by fire. The resemblance of these mineral threads to flax at once suggests that they might be woven into an incombustible fabric; and this was done by the ancients, the cloth being mainly used for wrapping corpses for the funeral pile, in order to preserve the ashes of the body from being mixed with those of the materials used in burning it. In our day, some experiments have been made with fabrics of asbestos, especially as a material for firemen's dresses, but we are not aware that these have led to its permanent use for that purpose. Some years ago, it was tested in Paris, where firemen, wearing hoods or helmets of the incombustible cloth, and garments of it put on

over clothing, rendered fireproof by chemical preparations, remained for some minutes without injury in the midst of blazing piles of wood and straw. Asbestos has also been used for lining safes, for making incombustible wicks for lamps, and for chemical filters, but its industrial application is still very limited. The mineral is found in many localities, but the chief deposits of it are in Savoy and Corsica, and on Staten Island, in New York harbor."

In addition to the uses specified above, asbestos is very extensively employed for roofing and for liquid paints, on account of its fire-proof and non-conducting qualities, the H. W. Johns Manufacturing Company, New York, now turning out more than two miles a day of asbestos roofing, and large quantities of liquid paints of which asbestos is a constituent. Among other articles manufactured by this company and supplying wants universally experienced before their introduction, are asbestos steam-pipe and boiler coverings, asbestos cement, for cementing joints in stone, wood, and metals, concrete coating, prepared ready for the trowel, and forming a fire-proof covering that resembles stone; fire-proof coating, fire proof paper, and asbestos cloth and thread, etc.

A. J. Slicer, Elizaville, Ky., is putting one of Simpson & Gault's Separators in his mill.

Messrs. Brooks & Gaster, Darberville, O., have ordered one of Simpson & Gault's Pony Middling Mills.

Guthrie Long, of Owensboro, Ky., has ordered two Gladiator dustless corn shellers of Simpson & Gault.

Rullman & Sunman are putting one of Simpson & Gault's Champion smutters in their mill at Oldenberg, Ind.

T. W. Sheward, Wilmington, Del., is putting one of Simpson & Gault's Champion smutters in his mill at that place.

Simpson & Gault are furnishing F. Miller & Co., Watertown, Wis., an 8-reel chest, complete with cloth for same.

H. Mueller & Co., malters of Cleveland, are putting one of Simpson & Gault's warehouse separators in their brewery.

Simpson & Gault are remodeling Greek & Hallett's mill at Princeton, Ind., changing it to new process, and are adding two run of 48-inch burrs, one No. 2 Champion brush, one No. 2 Champion smutter, etc.

Stiles & Johnson, Monroe, Mich., have ordered a No. 2 Snowflake purifier, with the cloth-cleaning attachment, from Simpson & Gault.

John Boyle, of St. Martins, O., is putting one of Simpson & Gault's Champion smutters, one No. 2 purifier, and other machinery, in his mill at that place.

J. Sutchin & Sons, Middletown, O., are rebuilding, and are adding one bolt chest, two 30-inch mills, all necessary gearing, etc. Simpson & Gault are furnishing the same.

N. S. Gregg, Circleville, O., is enlarging his mill at that place, and is adding one Victor wheel, four run of 42-inch burrs, etc. Simpson & Gault are furnishing the same.

Bradford & Smith are adding a Gladiator sheller to their mill at Harrison, O., also putting new cloth on their reels and overhauling the same thoroughly. Simpson & Gault are doing the work.

W. G. Pennypacker, of Philadelphia, Pa., is making some improvements on his mill there, and is adding three run of 36-inch stones, one Economic packer, etc., all the machinery is being built at Simpson & Gault's factory.

Kyle Bros., of Hopewell, O., have contracted with Simpson & Gault for a 6-reel chest, one No. 3 Snowflake purifier, one separator, two run of 30-inch stones for wheat, one 26-inch for corn, and one 22-inch for bran, also one packer, gearing, etc.

The Ottumwa (Iowa) Starch Co., which started about two years ago, with a capacity for working up about 2,000 bushels of corn per day, has been successfully managed that the demand for its product has entirely outgrown that capacity. They are now erecting an additional new brick building 70x90 in size, two stories and basement, which will nearly double the capacity of the works. They will also largely increase their facilities for shipping by having a switch run from the C. B. & Q. track along side the new building, so that cars can be loaded directly from the factory. The largely increased demand for the Ottumwa starch is the best evidence of its superior quality, coming in competition as it does with the product of many old and long-established factories.

# THE UNITED STATES MILLER.

## Bunt and Smut.

The names bunt and smut are indifferently applied to a class of fungoid diseases which attack all grain crops more or less. The chief predisposing cause of the appearance of these parasites is a warm abnormally wet summer. The bunt of wheat "Tilletia caries," also known as brand, black ball and pepper bran, attacks every kind of wheat, spelt having less to fear from it than other sorts, and winter less than summer wheats. The fungus fills up with its spores the whole of the ovary, so that at the time of ripening there is found in place of the grain an elongated, black, greasy body of the most disagreeable odor.

Smut "Ustilago carbo," more especially attacks oats, so that the phrase "smut of oats," has become familiar. The disease first shows itself in the organs of fructification, the epidermis of which is irregularly ruptured in a great number of places, a black powder then appearing through the slits. The different parts of the flower are attacked in a very unequal degree. The whole of the parenchymatous tissues is often destroyed, and so much is this the case in winter barley that of the whole ear the common awns of the inflorescence alone remains, while in other cases, as in oats, the seed only is destroyed, the rales, or glumes, inclosing the grain, remaining unaffected. During the progress of the disease, and especially towards its later stages, the black dust consisting of the spores also emerges from the culms beneath the flowers and even from leaves. "Ustilago maidis" is the smut of maize, which converts the grains into large tumors filled with the black dusty spores, the diseased part frequently exhibiting swellings as large as the fist, and sometimes the size of the head. "Ustilago occulta" fructifies in the leaves and haulms of the rye, while the millet smut, "Ustilago destruens," destroys the whole of the flower, even before the ears have emerged from the leaf sheath. Besides wheat, barley, oats, rye, maize, millet and duri, various species of grass are liable to the attacks of bunt and smut, so that the disease is often very widely spread.

These parasites were, with rust "Puccinia graminis," long included by fungologists in the division Hypodermii, on account of their vegetating beneath the epidermis of the host plant. Recently, Ferdinand Cohn, a celebrated German botanist, has advanced reasons for assigning bunt and smut to separate orders, the "Ustilagineæ," (from "rustus," burnt, destroyed) the rust being relegated to the order Aecutiomyceces, this and the one already mentioned forming two orders of the highest group of fungi, the "carposporae."

The life history of the parasites now under consideration is comparatively simple. When one of the microscopic spores germinates it gives rise to a delicate hyphal tube, the promycelium, which soon begins to branch, and after a while the branches conjugate, or become fused together; the place of union swells somewhat, and forms what is called a sporidium, and this develops the delicate web, or mycelium of branching hyphae, which can always be found by the aid of a microscope beneath the epidermis of the infested part. The free ends of the mycelial hyphae become constricted off into a series of spores, which, one after another, fall away, and by thus establishing its independence within the host-plant, each spore is capable of giving rise to the same series of changes as those we have just described. The life history of the Ustilagineæ may, therefore, be represented thus: Spore—promycelium—conjugating branches—sporidia—mycelium—spore.

The manner in which bunt and smut are enabled to infect the growing plant is by the introduction of the spores in the seed. Grains of wheat, oats, etc., may look perfectly sound, and yet may contain a few of the minute spores; these germinate at the same time as the seed, and as the young plant grows, the mycelium is carried up with it, and vegetates most luxuriantly in the delicate parenchymatous tissues of the inflorescence, absorbing all the nutritive juices sent up for the nourishment of the grain, and producing at a prodigious rate crop after crop of sooty spores, which sometimes entirely usurp the position of the grain. The latter retains its shape, but when pressed between the fingers it either crumbles like a mass of soot or misca in unctuous black pulp, which smells like putrid fish. In the process of harvesting, and in a boisterous wind, the spores get scattered broadcast, and thus it becomes a difficult matter to insure that any grain that has grown in the neighborhood of the field infested with bunt or smut, shall itself be entirely free from the contagion.

It has long been known that bunt and smut

are transmitted through the seed, and all remedial practices are based on this fact. The grains intended for seed are washed or pickled in various solutions before being sown. The uses of corrosive sublimate and arsenic for this purpose are now abandoned, because, though they destroy the spores, they also impair the vitality of the seed. A strong solution of Glauber's salts (sulphate of sodium) is undoubtedly of value, but by far the most useful agent is blue vitriol (sulphate of copper) which is a blue crystallized substance, prepared by dissolving the worn out copper plates from ship bottoms in sulphuric acid. The blue vitriol is powdered, and two ounces are dissolved for each pint of water, one pint of the solution being the quantity employed for dressing one bushel of wheat. The grain is laid on the floor, and while being spread about with a shovel, the solution is sprinkled over it and is absorbed, and so kills the spores without affecting the vitality of the grain. The application of sulphate of copper as an antiseptic agent in this way will probably be much extended, for an agricultural chemist has very lately adduced some valuable experimental evidence in justification of this use of blue vitriol.

Bunt and smut are, as we have shown, very wide-spread in their ravages, not only the cereals, but many grasses, and even other plants quite outside the order of natural Gramineæ, being liable. Of the cultivated cereals, rye is perhaps attacked less frequently than any of the others; but nature compensates for this in the fact that rye is most subject to the attacks of the dangerous ergot. The flour from bunted wheat will always fetch a price; it is generally used for making dark-colored food, such as ginger-bread, and no harm is known to arise to those who eat it.

In conclusion, we may compare bunt and smut with rust. The two former have but one kind of spore corresponding with the teliospore of rust. Rust requires two host plants for the completion of its life history. Bunt and smut are confined to the same host throughout. Rust attacks chiefly the leaves and culms of the host plant, so that the straw suffers most, while the grain only suffers indirectly, in consequence of the impairment of the efficacy of the organs which should prepare the nourishment for the grain; in bunt and smut, on the other hand, the grain itself is the victim. Lastly, the spores of rust are brownish or reddish, never quite black; while those of bunt and smut are best described as sooty.—*Murk Lane Express.*

## A California Dam and Escape Weir.

The following interesting description from the Sacramento *Record-Union*, of one of the undertakings of hydraulic engineers in California, will no doubt be read with interest:

The crevasse known as the English break is a washout through the west bank of the Sacramento River, about four miles above the Sacramento and Yolo bridge. The levee is destroyed for about 525 feet in length, and a crevasse 24 1-10 feet in depth is cut through the natural bank for an average width of 132 feet. Upon the plane of the natural bank level this break is about 180 feet in length. It has been seriously feared that longer neglect of this break would result in the river some day taking its course through the crevasse and finding a new channel through the low lands on the west of the present river bed, a result which would entail vast damage, and be a serious injury to the whole state. The Board of Drainage Commissioners of Drainage District No. 1 have resolved to secure this crevasse from further enlargement, and to bring its bottom line up to a level about five feet below full flood stage in the river. For this purpose a dam of small trees and brush, built after the plans and specifications originally drawn for the dams contracted for on the Yuba and Bear rivers, is to be built across the opening on a line well behind the deep cut, and connected with the levee above and below it by means of an embankment of earth.

In the main, the proposed structure will consist of two sections of levee, to be placed nearly at right angles to the main levee upon the bank of the river, and terminating in abutments with wing-bulkheads to protect the extremities from abrasion. The intervening space between the bulkheads is to be filled with a brush dam of from four to six feet in height above the average level of the present surface, the centre of the crest of the dam to be upon an arc of about 372 feet radius. The general character of the dam is to be the same as those specified and contracted for in the Yuba and Bear rivers. The dam is to be so constructed that its crest as represented by the upper edges or corners of all the tree butts which end at the top surface throughout the width, on completion of the work, shall be within four-tenths of a foot of one level plane. The overall face must be on a uniform slope of about 45 degrees. The foundation of the dam is to be laid in level benches at depths below the general surface of the adjacent ground. When completed, the crest will not vary more than four-tenths of a foot from a level plane across it. The trees on the up-stream face of

the dam will lie in a plane within 5 degrees of the slope of one foot vertical to two feet horizontal, and its down-stream face will lie in a plane within 5 degrees of a slope of one foot vertical to one foot horizontal. In making the excavation for the foundation or subgrade within which the brush laying will begin, if it is found that a suitable foundation cannot be had at the estimated depth, the contractors are bound to go as much as twice the depth originally designated, but it is provided that they need not go down over 6 feet on the average for any 100 feet of foundation. The structure is to be built in this manner: The lower apron will be first built and laid entirely beneath the average plain of the ground's surface. The material to be used will consist of small trees, ranging from 20 to 30 feet in length in the average-sized structure, and of greater or less length, as may be required, in the longer or smaller cross-section, and from 4 to 7 inches in diameter at the butt, laid closely together lengthways up and down the stream, in horizontal layers separated by smaller poles, planted three feet apart and parallel with the line of the dam, the whole consolidated and filled in with smaller brush and spare material that is being moved. The poles of each set are to be spiked solidly down upon the tree trunks below, and the trees of each layer are to be spiked to the poles upon which they rest. Heavy stakes are to be driven as firmly as can be done with a ten-pound sledge, five feet apart, through and along the upper edge of the spron, to which the pole and trees are to be firmly secured. The upper apron, to be laid partially below and partially above the natural surface of the ground, is to be next built. This apron rests partly upon the lower apron and partly upon the ground above, and is to be composed of the same class of materials as the lower apron, and laid in the following manner: Small trees, or trunks of trees, varying from 15 to 20 feet in length for the average sized structure, and of greater or less length for the larger or smaller sections, and from six to seven inches in diameter at the butt, are to be laid closely together lengthways up and down stream, in layers sloping downward, and retreating upstream, the butts exposed in the down stream edge of each layer, covered or buried at the up-stream edge for the greater portion of their length. Alternating with these layers of trees, poles of a smaller diameter are to be laid, three feet apart, crossing the trees substantially at right angles. The intervening spaces are to be well filled and consolidated with small brush and spare material that is being moved. The poles of each set are to be solidly spiked down as in the first instance, and heavy stakes are to be driven as before.

The dam, resting partly upon the up-stream edge of the upper apron, partially upon the ground's surface next above, and partially in a pit at the upper edge, is to be next built. In its composition it is to be similar to the upper apron. Small trees or trunks of trees 1½ to 18 feet in length, and 6 to 8 inches in diameter at the butt, are to be laid closely together lengthways up and down stream, in layers sloping downward in an up-stream direction, the butts exposed on the down-stream edge of each layer. Alternating with these layers of trees, poles of a smaller diameter are to be laid, crossing the trees substantially at right angles. The intervening spaces between the trees and layers are to be well filled with small brush and spare material. In this manner the dam is to be built up to the intended elevation of its crest, and then trees of a larger diameter, and 25 to 30 feet in length, are to be used, with their butts in rows forming the crest of the dam, their trunks sloping downward upstream, their tops buried in the pit, and incorporated with brush and earth. On the up-stream face of the dam, and on the top, a back of such material as may have been excavated from the pit beneath is to be placed. With the consent of the Board of Directors a layer good second-hand grain sacks, filled with sand, and strongly closed, may be used either to supplement or as a substitute for the earth backing to an extent of at least three sand bags for each lineal foot of dam.

At each end of the overflow of the dam, at the juncture with the projecting levee, will be constructed an abutment of timber and plank, filled with sand, earth and brush. The surface of the ground beneath each abutment is to be excavated to the depth of 3 feet below the natural surface. The ends of the dam are to be well built into the abutment and firmly secured to the timbers which comprise its frame. The frame is to be of 8 inch square timber, and the planking is to be 2 and 3 inch plank. The interiors of the abutments are to be filled with sand bags. At each end of the dam are to be built earth levees, 8 feet on top, with slopes 5 to 1 on the river side, and 2½ to 1 on the land side. The old levee crown, for 200 feet each side the break, is to be re-formed and raised. To protect the levee a brush revetment is to be built where needed on the water slope of the levee from its base to within three feet of its crown, and will consist of layers of brush and cross layers of saplings, cross-pegs down, thus making a mattress. Brush spurs, at right angles to the embankment, are to be built from the face of the levee to the river bank, a distance of 90 feet. The details of this brush spur work are elaborate, and call for very superior and strong structures. There will be about 450 feet of this spur work, averaging six feet in height. The spur work may be described as that of inclined open work walls of brush, supported on a string-piece or ridge-pole resting in a crotch of small, rough timber cross-horses placed at convenient intervals.

There are 263 boats frozen up in the Erie canal. Of these 117 are East bound, mostly loaded with grain, aggregating 7,000,000 bushels.

## Heating by Friction.

NOVEL AND USEFUL INVENTION OF A BOSTON SCIENTIST.

A Boston gentleman has invented a simple device, which, if its present promises are realized, ought to work a revolution in methods of heating. It is nothing less than an invention to use friction as a practical means of producing heat. At the time of the Ashtabula horror, when so many persons were burned to death by the wrecked cars catching fire from the stoves, Mr. Webster Wells, then the Professor of Mathematics at the Massachusetts Institute of Technology, began to consider the problem of heating the cars without fire. He has now solved it. His invention consists of a strong iron cylinder, at one end of which, inside, is a fixed plate of hardened iron, against which, firmly attached to a revolving shaft, another plate presses, either closely or lightly, as required. The cylinder is filled with water, and this, heated by the friction of the two plates, circulates through pipes, warming the room through which they run, just as steam pipes do. The water is kept in constant circulation in these pipes, returning to the cylinder to be heated over again. The water in the cylinder, which is brought to a high degree of heat in a remarkably short time, keeps the plates lubricated, preventing their wearing away at a rapid rate. When worn away the cost of renewing them is trifling, and the machine has no complicated work about it, so that it is easily kept in repair. The power required to run the machine is so slight that the waste or surplus power of the engines in use for running elevators and other machinery in hundreds of buildings throughout a city is enough for ordinary purposes. The machine can be utilized in any place where power is used. The ordinary sized machine has 36 square inches of friction surface in its plates, sufficient it is said, to heat 10,000 cubic feet of space. This requires but half a horse power. A machine with 225 square inches of friction requires but four horse power, and would heat a room 60x200 feet, or containing 126 cubic feet. In railroad cars the machine is operated by power taken direct from the wheels, doing away with all danger from fire in case of a smash-up. When the cars are standing still the machine can be operated by power from the locomotive, by a contrivance somewhat like that which operates the Westinghouse brake. In mills it is calculated that a great saving can be made both in fuel and in the rates of insurance, especially in those run by water-power. The agent of a mill where water-power is used estimated that in twenty years by the use of this device, a saving of at least \$185,000 in fuel alone could be effected. Prof. Wells is now in Europe, looking out for his patents there. The machine has now been in operation in Boston for seven months.—*Boston Herald.*

**SARA BERNHARDI'S THREAT.**—Mademoiselle Bernhardt threatens to sue the *American Queen* for damages for defamation of character, under the laws against libel. We have never said anything about her that was not true, and have never wished to wantonly injure her or hurt her feelings. We have not sought to damage her professionally; have not advised our readers to stay away from her acting. We have merely said that the fact that she has several children born out of wedlock makes her an unfit companion for virtuous American maidens and matrons. She thinks this is squeamishness; prudery; affectation; hypocrisy; but this is because she does not comprehend American morals and manners. The *Queen* warned the ladies of New York for their own sake—for the sake of good society—because its function is a social one, and it had no right to shirk the responsibility. Mademoiselle may prosecute us for libel; but we congratulate the ladies of the metropolis that even a written appeal from the future King of England did not win for her a single invitation to any respectable home, with possibly one or two exceptions.—*Andrew's American Queen.*

\$25,000 worth of improvements are to be added to the Vermilion Mills at Hastings, Minn. 20 sets of rolls will be added.



This is the King of Saw Machines. It saws off a 2 foot log in 2 minutes. \$20,000 in use. The cheapest machine made, and fully warranted. Circular free. United States Manufacturing Co., Chicago, Ill.



## THE UNITED STATES MILLER.

## FLOUR MILL FOR SALE.

Any one desiring to purchase a 3-run Mill, driven by two water wheels, in a good neighborhood, and suitable for custom or merchant work will, address

A. C. BURNETT,

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[Mention U. S. MILLER when you write.]

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**IMPORTANT NOTICE TO MILLERS.**—The Richmond Mill Works and Richmond Mill Furnishing Works are wholly removed to Indianapolis, Ind., with all the former patterns, tools, and machinery, and those of the firm who formerly built up and established the reputation of this house; therefore, to save delay or miscarriage, all letters intended for this concern should be addressed with care to Nordyke & Marmon Co., Indianapolis, Ind.

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## 4-Run Steam Flour Mill For Sale

At La Grange, Mo. It has also a large corn run and machinery for kiln-drying meal. Machinery all in good order. Good shipping facilities by river and rail. Will be sold cheap and on easy terms. It is located in a first-class winter wheat country. Address

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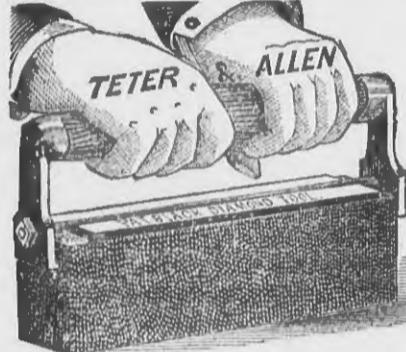
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As miller by a single man, age 34, 18 years of experience. Is a good stoneman and accountant, is strictly temperate, and uses no tobacco. Address

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Over 4000 now in use. Guaranteed the best Tool in the market for smoothing the face and furrows, removing glaze, and restoring the burrs to their sharp, natural grit. It is far superior to Emery or Corundum. Used with or without water. Too large to send by mail. Price, \$8.50. Will send our Tool on trial against any other in the market. Miller's to pay for the best after a trial. Sold by Mill Furnishers throughout the world.

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Unquestionable references furnished in Europe or America on application. Address all communications to

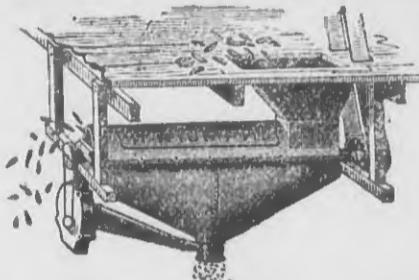
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N.B.—I respectfully ask that manufacturers of American milling machinery and agricultural machinery will favor me with their catalogues. Address as above.

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Shells and Cleans 2,000 Bushels Ears per day.

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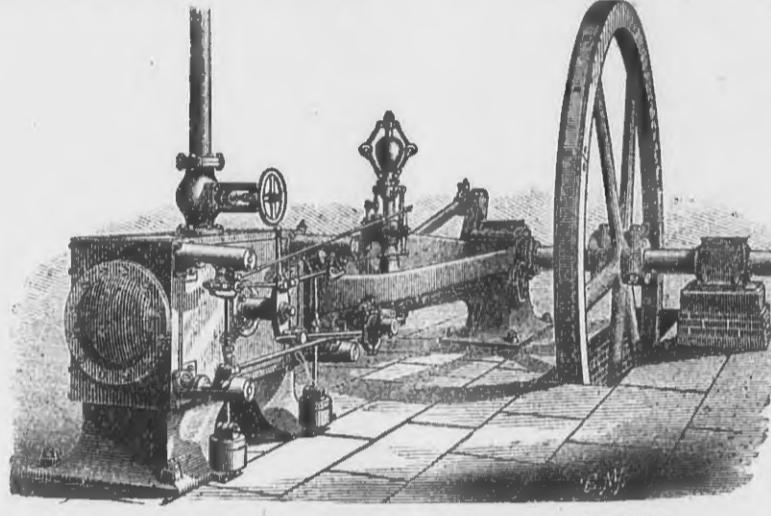
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We offer four run of stones, 4½ feet in diameter, with spindle, curb, iron burst frame, pulleys, Johnson's patent universal driver, etc., all complete, ready to set up and run at once. Apply at once to

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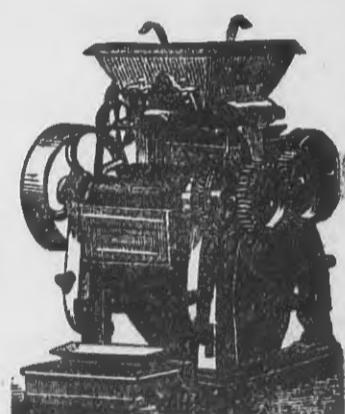
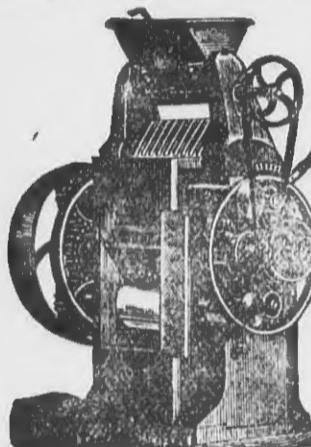
VIENNA EXHIBITION. 1873, Awarded Diploma of Honor.

PARIS EXHIBITION, 1878, Awarded 2 Gold Medals and 1 Silver Medal.

## GANZ &amp; CO.,

## Iron Foundry and Manufacturing Association,

Buda-Pesth, Hungary; or Ratibor, Germany.



We take this method of recommending to the American milling public our PATENT ROLLER MILLS with chilled cast iron rollers, for crushing and grinding wheat, which have met with such eminent success in Europe. The mill-owners of BUDA-PESTH, as well as the prominent millers of Austro-Hungary, and a large number in Southern Germany, Switzerland and England, have provided for their mills the celebrated GANZ ROLLER MILLS, which are about to supplant entirely grinding on mill-stones, their working being more perfect, producing more white flour, requiring less power than the best mill-stone, and wanting no repairs excepting to occasionally replace a bearing. We have introduced into the art of milling these Roller Mills with chilled cast iron rollers, and from 1874 to January, 1878, we have delivered in the different European countries, Africa and the United States of America about 2,100 mills, and all work satisfactorily. Our crushing mills may now be regarded as absolutely necessary for every well-furnished modern mill, and this is proven by the numerous testimonials at hand. Our grinding mills are remarkable for their absolute discharge bearings, by means of the newly-devised Anti-Friction Pressure Rings. These Rings allow a very high pressure, and hence assure the performance of a great deal of work, avoiding all waste of power caused in other machines by friction in the bearings.

Out of numerous testimonials at hand we select the following:

BUDA-PESTH, March 28, 1878.—To Messrs. Ganz & Co., Foundry and Engineering Co., Limited, Buda-Pesth: Complying with your request to communicate to you my experience with your Roller material, I have pleasure in stating that I consider it, i. e., your generally well-known chilled iron, as the best within my experience, and its adoption has satisfied me in every respect, so that I do not hesitate to assert, by introducing it on a large scale, you have rendered a considerable service to the milling art. Your material is equally well adapted for rough grinding, softening or grinding. Owing to its great hardness I cannot characterize it otherwise than indestructible. The grooved cracking rollers have demonstrated this hardness, as also a toughness, of your castings in a manner which astonishes all who know the rapid wear of cutting edges used in the treatment of grain. Your smooth rollers, once properly ground, preserve their complete cylindrical form, and do not require any repair for a period which even now cannot be estimated. They acquire, soon after being put to work, a finely-gritted surface texture, eminently adapted for grinding as well as for drawing down the meal, a condition which they preserve without change. It is quite superfluous to prove that there can be absolutely no question of discoloring unless with reference to new rollers, to which some remnants of oil, emery or other matter may yet adhere. The flour produced by your Chilled-Iron Rollers is very lively and has remarkable baking qualities. While stating the above to the best of my conviction to you, in reply to your inquiry, I seize with pleasure this opportunity to express to you my thorough approbation, not only of your roller material, but also generally of your roller mill construction. Your rough grinding (cracking) with chilled-iron roller mills constitutes such an essential step in advance as compared to the rough grinding with stones, that they cannot fail to win their way into every well-built mill, working on the high or half-high grinding system. For the purposes of reduction to flour you have lately formed a form of mill which I consider extraordinarily successful. You have by the introduction of an entirely new mechanical organ, i. e., the Rotary Anti-friction Spring Pressure Ring, solved the problem of discharged bearings, which has so often been raised and as often dropped again unanswered. You have achieved success with decided aptitude in a manner as wondrous as it is simple and practical. This Roller Mill absorbs, in fact, only just the power required for the reduction into flour, and none for bearing friction which, usually, as is well known, amounts to a high figure. This Flour Mill receives an agreeable and light form while attaining a capacity hitherto unknown. In handing you the above communication for use as you may deem desirable, I remain, etc.

(Signed) C. HAGGENMACHER, Director of the First Ofen-Pesth Steam Mills.

TIVOLI KUNSTMUEHLE, Munich, April 5, 1878.—To Messrs. Ganz & Co., Engineers, Buda-Pesth—Dear Sirs: In reply to your esteemed of March 28, we have pleasure in testifying to our satisfaction with the Chilled-Iron Rollers

supplied to us by you. We have now had both smooth and fluted Rollers in use for the last two years, and have not found any appreciable wear in the smooth rollers. With reference to the work and capacity we can but report favorably. The flour produced by them is lively, and not killed as is stated in some quarters, while its baking properties are first rate. Referring to the lately supplied fluted rollers, Machwart's patent, grooved on the new method, they work admirably and are especially to be recommended for mellow wheats. Reassessing, your Roller material is as tough as it is hard, and therefore in every way adapted for the purpose it is intended.

TIVOLI KUNSTMUEHLE, A. MUELLER.

BUDA-PESTH, July 16, 1878.—Messrs. Ganz & Co., Buda-Pesth—Gentlemen: The most satisfactory results which, on testing the different Wheat-breaking Machines, we obtained from your Fluted Rollers, induced us to adopt your system and, in consequence, we already provided our mill with a great number of your Breaking-Rollers. In consideration of the experience derived from use of these Rollers we beg to point out as particular advantages of your Wheat-breaking System that extremely little flour is produced, provided the rollers are used as directed, that your Rollers most satisfactorily detach the Semolina from the Bran, and thoroughly separate the Germ Particles, and finally that they are of an astonishing durability, and that it requires no skilled labor to manage them. Moreover it must be stated that your system suits perfectly well any process of Breaking-Wheat. It affords us so much more pleasure to give you the above account, as we are inclined to think that by the construction of these Rollers you have achieved an essential progress in the milling industry. Yours truly,

PESTER WALTZMUEHL-GESELLSCHAFT. Riedle, m. p. Burhart, m. p.

BUDA-PESTH, July 11, 1878.—Messrs. Ganz & Co., Engineers, Buda-Pesth—Dear Sirs: Having had occasion to try your newly-patented Roller mills with others, known until now, I feel induced, regarding their excellent qualities to give orders for furnishing me the Roller mills to be erected in my two mills. These roller mills are to be recommended by their construction, surpassing all known until now, and especially for their remarkable capacity, doing much work with little power. Believe us, gentlemen. Yours truly,

HEINR. HAGGENMACHER.

BRANDENBURG, Bohemia, February 18, 1879.—Messrs. Ganz & Co., Buda-Pesth—Gents: I give you my best thanks for your delivering to me your well-made and well-working machines, as well as for these 2 machines you delivered me last year. I have no objection to your publishing this. Yours faithfully,

G. HANNAK, Civil Engineer and Mill-owner.

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